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ABSTRACT

Presented are environmental education lessons adapted for use by third-grade teachers in Pinellas County, Florida. Six conceptual schemes provide the manual's organizational framework: interrelationships, heredity and environment, change, effects of population growth, finite resources, and environmental responsibility. Following a discussion of each scheme are outlines of related activities. These learning experiences utilize outdoor studies, class discussions, audiovisual materials, and games to help students understand some ecological concepts and environmental management problems. Several examples are drawn from local situations. (MB)

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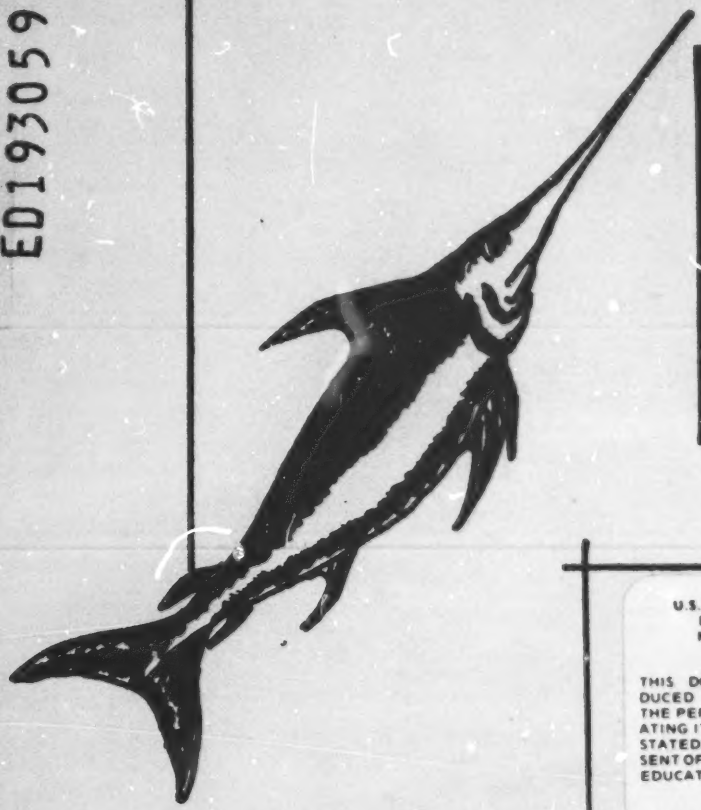
ENVIRONMENTAL EDUCATION INTERDISCIPLINARY CONCEPTS AND ACTIVITIES GUIDE

GRADE 3



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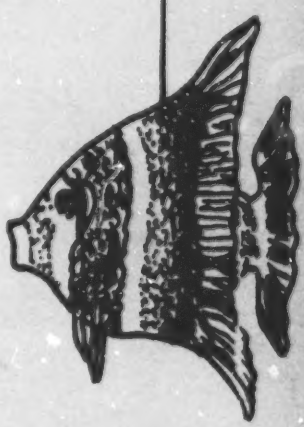

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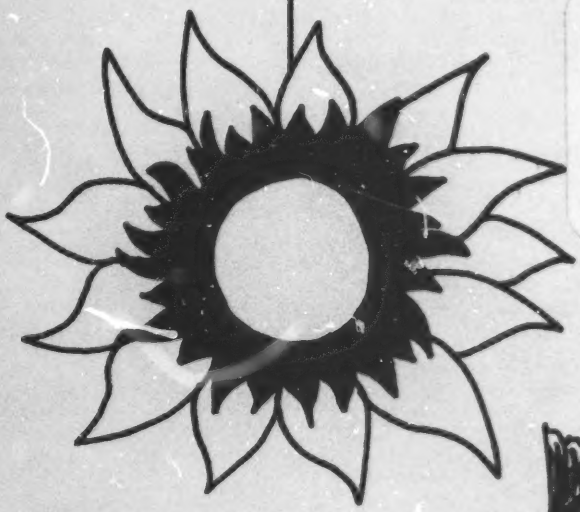

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The School Board of Pinellas County

Gus Sakkis, Superintendent

ENVIRONMENTAL EDUCATION

INTERDISCIPLINARY CONCEPTS and ACTIVITIES

GUIDE - GRADE 3

This publication is one of a series of interdisciplinary environmental activity guides made available for the elementary schools of Pinellas County. The original of this publication serves as the teaching nucleus for Environmental Education activities in grade three in Lee County, Florida. The development of the program was a joint effort of the teachers, students and staff of the Lee County Schools under the supervision, and in cooperation with the Lee County Environmental Education Center. The publication has been modified to facilitate its use in the schools of Pinellas County.

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TABLE OF CONTENTS

Introduction i

Conceptual Scheme I 1

All living things including man are interrelated and, therefore, are also interdependent.

Concept A 4

Living things depend on the producer, consumer and decomposer cycle for survival.

Concept B 8

All living things fit into a food web.

Concept C 16

Decomposers are essential to the life cycle in that they decompose dead organisms and recylce nutrients to producers.

Concept D 20

Each member of a community is dependent on every other member of a community.

Concept E 24

Many species are directly dependent on other species. (Symbiosis)

Conceptual Scheme II 27

Heredity and environment interact to determine the characterisitcs of an organism and, therefore, a population.

Concept A 30

The hereditary characteristics of an organism frequently protect it from predation (e.g. shape and coloration).

Concept B 33

The physical expression of many hereditary characteristics is modified by environmental factors.

Conceptual Scheme III 37

Living things and environments are in a continuous state of change.

Concept A 40

Since natural changes usually follow a regular pattern, they are predictable.

Concept B 43

Decomposition is a regular and, therefore, predictable form of change.

Conceptual Scheme IV 47

As a population increases, its effects on the environment become more pronounced.

Concept A 50

Density is an expression of the number of plants or animals per unit area.

Conceptual Scheme V 53

We live in a world of finite resources and almost infinite demands on those resources.

Concept A 56

As it provides a great deal to man's quality of life and plays an essential role in the environment, wildlife is one of our most important natural resources.

Concept B 61

Air is essential to life.

Concept C 65

We must recycle our resources to keep from exhausting them.

Conceptual Scheme VI 71

Each individual has a role as an agent for change in the environment and therefore has a responsibility to the environment.

Concept A 74

In purchasing manufactured goods we are frequently guilty of damaging the environment.

Concept B 79

Man can accelerate the destruction of species by altering their habitats.

Environmental Interest Activities 83

MATERIALS BIBLIOGRAPHY 115

INTRODUCTION

Pinellas County has experienced a tremendous influx of permanent residents over the past few years. It is beginning to experience many of the problems associated with a high density population contained within a limited geographical area. The environment of Pinellas County, which has provided an abundancy of clean water, air, greenery, and sun, has been a major attraction for the young and old, the working people, and many of the retired. It is these very things, however, which are being strained by the demands of a steadily increasing population.

Within the last few years, problems have arisen in providing enough fresh potable water, effective waste disposal and sewage treatment, electric power, fuel oil, gasoline, other energy sources, recreational areas, and other such services and supplies which people need. Air and water pollution, once completely foreign to the county, are now becoming increasingly evident. Long term residents give testimony to the rapidly declining quality of the environment. They are complaining, and rightfully so, that the quality of the environment which attracted them to settle here has been adversely affected.

If the present growth-use trends are permitted to continue for too many years, Pinellas County will, indeed, find itself in severe trouble. Not only will it become increasingly difficult to maintain the services which people expect and demand, but it will also be highly improbable that the deterioration of the environment will be slowed or reversed. There may come a time, in the not too distant future, when Pinellas County will

not be an attractive place, either to live, or visit. When this occurs, one of the major economic bases of this county, that of tourism, will be reduced drastically. This, most certainly, will result in an even further decline in the ability of the county to maintain services and support.

The energy crisis has recently become one of the foremost problems in Pinellas County. This has been particularly felt in a county where over 80% of the residents depend on their automobiles for transportation to and from work. It is now apparent that the need for an efficient mass transportation system is immediate, but such a system is slow in coming. The availability of electrical power is now just barely ahead of the demand. If the demand continues to increase at its present rate, it will soon exceed the available supply, and yet another energy crisis will be experienced in Pinellas County. Alternate plans of energy supply have not yet been exploited. Solar energy could represent one of the best alternatives for Pinellas County, and most of Florida.

There is no easy or simple answer to the environmental problems of Pinellas County due to the complexity of the causative agents. One of the answers lies in effective city and county planning and management. This, however, depends to a large extent on educated and responsive citizenry. Unless the residents who consider Pinellas County their permanent home become aware of the long range cause and effect aspects of county management and growth potential, and the combined effects on the environment, little will be done to

protect their interests. In the past, it has been the case of too little and too late.

The educational system of Pinellas County can provide an opportunity for the citizens that it serves to become familiar with the environment in which they live and in the important part that it plays in their lives. Through a good comprehensive program, the citizens may not only become aware of the problems and the alternatives, but they may also advance to actually helping with the solutions to some of the problems.

Today's students are going to face an ever-increasing burden of environmental choices. Many of these choices are not going to be easy. The students will require a good foundation in several discipline areas as the solutions to environmental problems usually encompass the total spectrum of human thought and activity. Determination of the level of pollution in a waterway is only the first step toward the solution of a problem. Correcting the degradation of the waterway will require input from politicians, scientists, businessmen, communication experts, frequently artists, and always the general public. Attaining environmental quality is everyone's responsibility, and, as such, is going to require knowledge on the part of all our citizens. If your students are to make intelligent choices they will feel comfortable living with, they are going to need you to provide them with much of the background information they will need. Our environmental problems demand our attention in every phase

of the curriculum so that our students can be prepared to solve this enigma.

Predicting the experiences and knowledge students will need in the future is always a difficult task. However, a few basics are readily identifiable. It seems logical to assume that a person cannot make intelligent decisions if he is not aware of the problem, or even the existence of the area that has the problem. Next, it is important that he understands or has some basic knowledge about the stressed area and the stress factors involved. Finally, once an individual is aware of a problem and has knowledge about it, he must have the tools to effect a solution for the problem. Thus, awareness of the environment, knowledge of the environment and action in the sense of effecting a solution are three themes in educating a student to prepare him for environmental choices.

You will notice that each of the concepts is placed into one of six fundamental conceptual schemes. Those conceptual schemes are listed before each section along with a brief explanation of their meaning.

Notice, as you look through the guide, that the conceptual schemes are divided into sections with a conceptual scheme and a full page picture to mark the beginning of each section. The pictures have been drawn to illustrate and further define the conceptual scheme. Note that every concept is also illustrated.

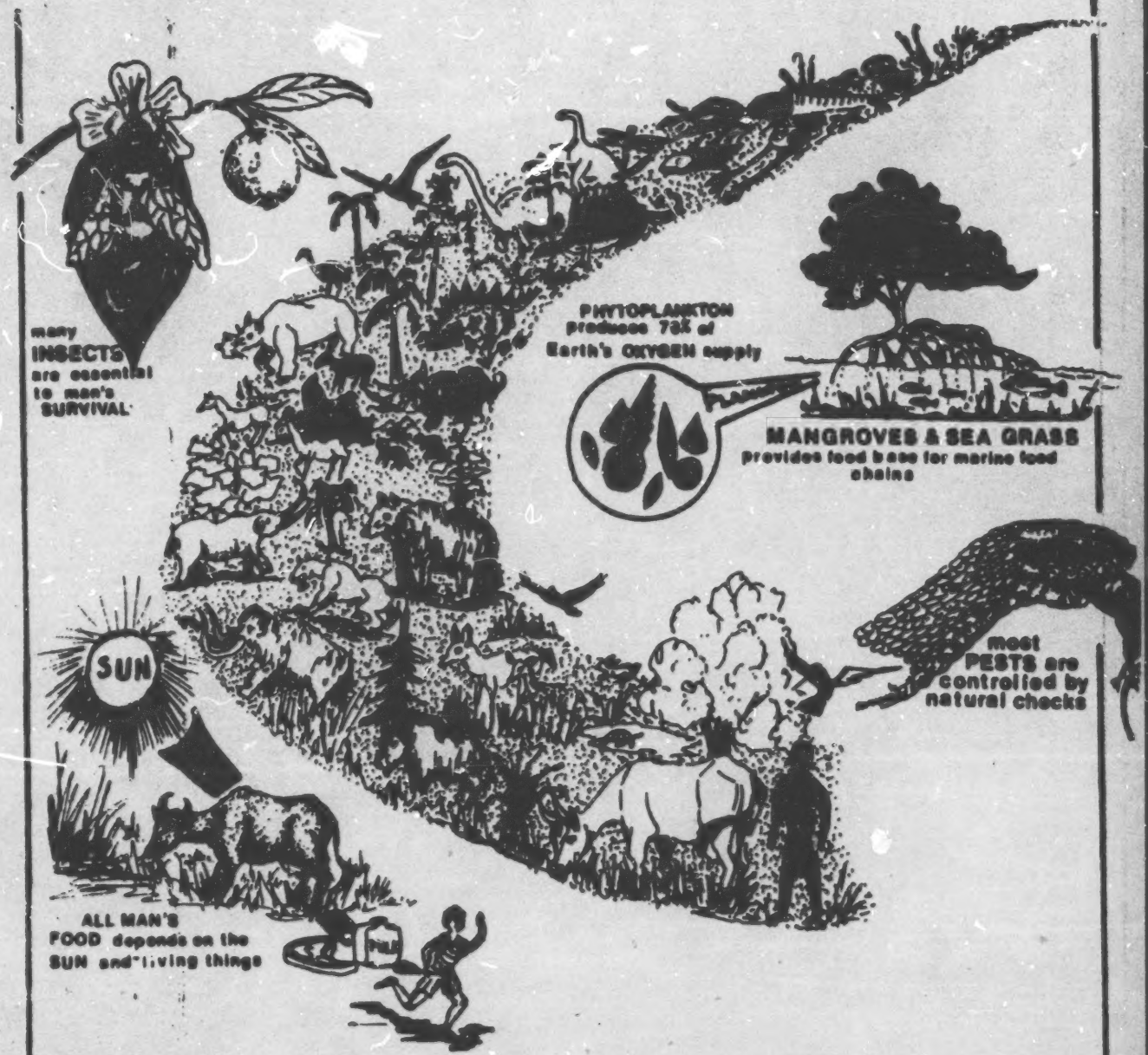
The activities following each concept are meant to be stimulators and frequently are not written in detail. Use the activities as idea suggestions and points of departure for further work relating to that concept.

Some of the activities refer to Matthew Brennan's Series entitled People and Their Environment. You should obtain a copy of these guides, if at all possible.

Hopefully, you will have an opportunity to cover each concept with at least one activity and, in this way, the student will have the whole package at the end of the school year. The guide was not written with the intent that you use every activity, but rather to give you a choice of activities for each concept. Since the guide itself is not sequenced, you do not have to do the first activities before you do the last. Feel free to enter the guide on any page and begin working. The intention is not to make these activities a separate environmental education program, but rather to blend them into your daily reading, arithmetic and writing activities.

CONCEPTUAL SCHEME I

All living things including man are interrelated and, therefore, are also interdependent.


many INSECTS are essential to man's SURVIVAL
PHYTOPLANKTON produces 70% of Earth's OXYGEN supply
MANGROVES & SEA GRASS provides food base for marine food chains
most PESTS are controlled by natural checks
SUN
ALL MAN'S FOOD depends on the SUN and living things

This concept is probably the most difficult idea for modern man to comprehend. Technology has removed modern man from his daily contact with the sun, land, plants, animals, and his concrete realization that he depends on them for survival.

When is the last time you thought of the insect that pollinated the orange blossom that enabled you to drink orange juice, or the plant that provided the food and oxygen for the cow that provided milk or hamburger for you?

The interrelationships man has with other living things is an all encompassing, interdependent web upon which the survival of all living things depend.

CONCEPTUAL SCHEME I

All living things, including man, are interrelated and, therefore, are also interdependent.

The interrelationship of all living things to one another has been a basic assumption derived from the biological study of genetics, evolution and social behavior since man began to write down his observations in the form of recorded history.

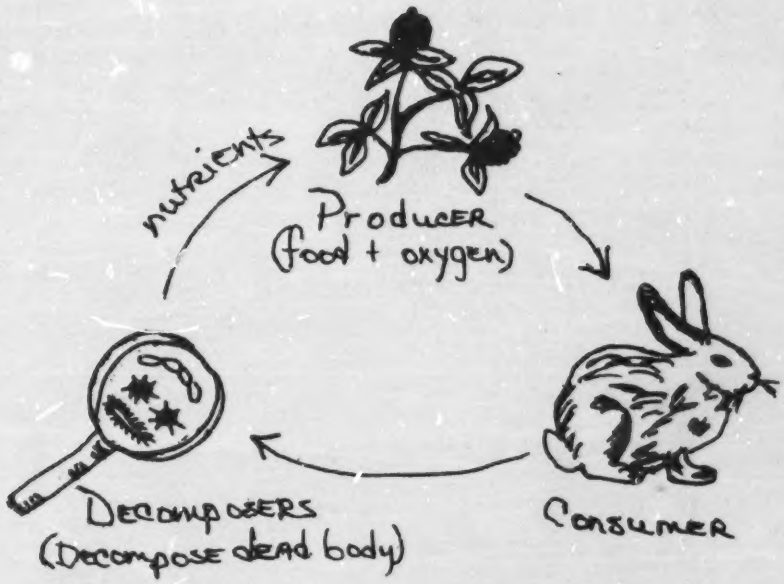
Biologists can show, too, that living things are not just interrelated, but they are also interdependent.

An analogy might be seen in the web of the fisherman's net. Each mesh is interrelated to those about it and dependent upon others for the support and strength necessary for efficient use in catching fish. If meshes are cut or broken, their loss fails not only themselves, but those that surround them. A point is finally reached when too many meshes are broken and the net can no longer serve its function of catching fish.

So it is in the ecosystem, the system of life, when too many species become extinct, or too many forests, marshes or mangroves are removed, or too much pollution is produced, hindering the living links, the ecosystem is made less efficient or stable, and ultimately runs the risk of breaking down. Remember, man is only one of the meshes in the net, and, while he has the ability to do some repair work, he alone cannot control the workings of the net.

Concept A

Living things depend on the producer, consumer and decomposer cycle for survival.



Life Cycle
(Cycle of Life)

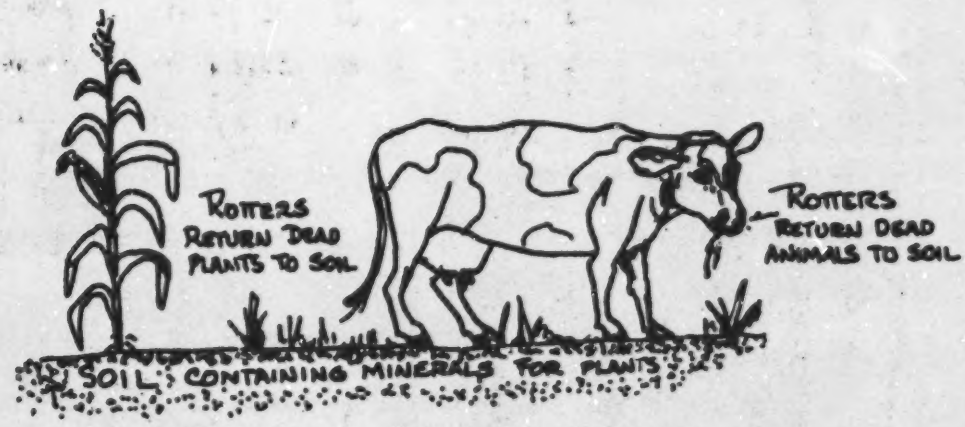
Activity 1

Developing the concept: In conjunction with both classroom science books* in third grade, present the producer, consumer and decomposer life cycle. (In primary lingo - makers, eaters, rotters.) By this time the children should understand the dependence of animals upon plants, and of plants upon the sun. Explain that plants and animals are two parts of a life "circle" or cycle. The children will see that with only these things the circle doesn't connect. Now

* Concepts in Science, Harcourt Brace
Learning by Investigating, Rand McNally (ESLI)

show the children a cup of good soil or decaying wood and ask them if they "see the living things in the soil or wood." They will agree they cannot see anything so at this time show them a microscope, or a picture of one, and some drawings or photographs of bacteria. Discuss how soil bacteria use water and air to "rot" or decompose once living substances, thus constantly resupplying the soil with the much needed humus and minerals for good plant growth.

Extending the concept: (Bulletin Board Project)



The above drawing presents the life cycle in simplified terms, to be used either for the basic structure of a bulletin board or on teacher-made study posters. If a bulletin board is made, the students can help by cutting the block lettering and helping with the design and cutting out the plants and animals. The large curving arrows can be made with yarn or marker pens. If desired, magazine pictures can be used in place of the hand-made life forms.

Fixing the concept: Use this next collage activity to reinforce each child's understanding of the cycle. First, take your class on a campus walk to collect some plant leaves or small branches. Also have one

student collect enough soil in a bag or box for all the class to use later in their collages. The children can cut animal pictures from magazines to represent the consumers or "eaters" in place of using the real things.

Give each child a piece of construction paper and have them sketch a large circle. Next they can arrange their "makers" and "eaters" in two sets to represent those two phases of the cycle. Lastly, the soil can be sprinkled on a small glue-covered area to represent the decomposers. Pieces of colorful yarn can be cut to form the directional arrows between groups. Additional audio-visual materials appropriate to this concept are: Film: Life on a Dead Tree; 574-1-004. Film: Terrarium Classroom Science; 635-2-001. Available from Pinellas County Media Center.

Activity 2

Use Lesson 12, "Plants For Food", in Brennan's People and Their Environment, Grades 1, 2, 3, pp. 32-34.

Activity 3

Ask the children to think about their pets at home.

--What do you do for your puppy? (Feed it, change the water, etc.)

--What happens when you forget to feed him?

--What do you do for your goldfish? (Feed it, change the water, etc.)

--What does the family do for the baby?

--How do you know when the baby is hungry or sleepy?

--Do each of these animals depend on the producer, consumer and decomposer cycle?

Activity 4

Show pictures of robins and inform the class that insect eating birds, like the robin, must fill their stomachs five or six times daily.

--Why do insect eating birds need the help of people in cold icy weather? (Most insects sleep or do not live in cold weather.)

--Why do we want to attract birds to our school, our homes, our gardens? (They are important to our world. They brighten our yards, gardens, woods, with color and fill them with song. They eat insects that eat our plants and crops. They scatter seeds.)

Activity 5

Students look carefully around a tree and list all the animals and plants that are in, on, beneath, and around it. Back in the classroom, challenge children to see how many interrelationships they can work out. Make charts of the web-like quality of life.

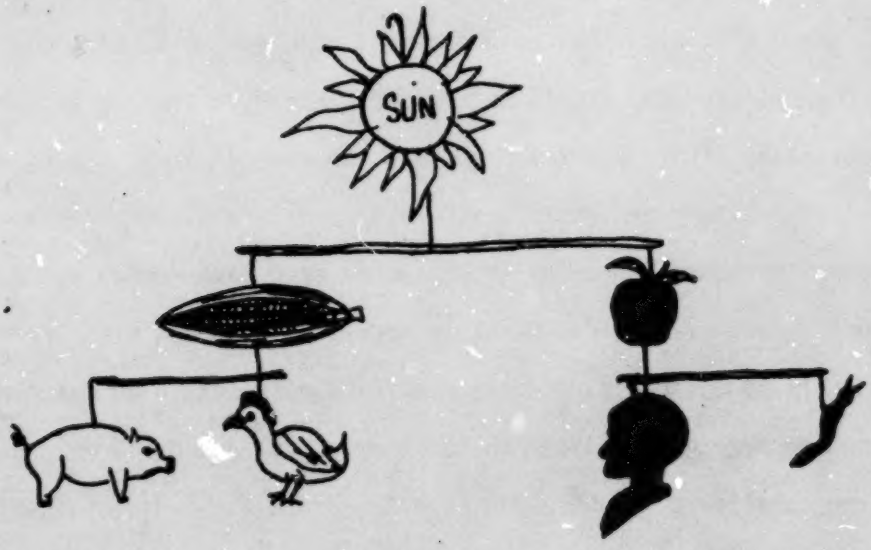
Concept B

All living things fit into a food web. (Apply this concept to a terrarium and to the school grounds.)

Activity 1

"Energy Mobiles" - Using a wire-cutting tool, cut 6 to 8 inch straight pieces from wire coat hangers. Each child will need three such wire pieces. (Have them each bring a hanger from home.) Pass out oaktag or construction paper to be used for the mobile objects. The highest point will be the sun and hanging from that should be a wire with a different plant hanging at each end. From each plant should hang a wire with a different "eater" at each end. For instance, a child might choose an ear of corn and an apple for his two plants. From the corn could hang a pig and a chicken, and from the apple could hang a boy and an apple worm. If a smaller mobile is desired, only one plant object need hang from the sun, and two animals from that plant, thus cutting the project completion time in half. Super-strength thread should be used to connect the objects to the wires. (A touch of white glue will keep the thread

from sliding.) It is recommended that, if construction paper is used, the paper figures be cut double and glued back to back to give better weight to the mobile. Warn the children that they will have to take care to balance their mobile objects so that they will hang properly. As each mobile is finished, hang them from a light fixture or from some other high place in the room. (Un-bent paper clips make excellent hanger hooks.)



Later, when everyone is finished, hold up one mobile and discuss what would happen to the mobile if a plant were removed. (Two animals would fall off.) This is elementary, but a good way to illustrate the interdependence within the food chain. An extra large and more extensive mobile could be a class Science project for a school display.

Activity 2

Make or purchase a "light-up board", which is actually a teaching machine that signals correct responses with a light. (directions for making a light-up board are found on page 13) Make a set of cards on predators, "Who eats who?"

Before allowing your students to use the board, make sure they understand the meaning of "predator". Ask questions such as:

--Is a predator's food plant or animal?

--How does a predator get his food?

--Is a rabbit a predator? A mouse?

--Are plant-eaters usually small animals?

(If last answer comes back, "Yes", ask-) Is a deer a predator? A horse?

--Are there also all sizes of predators? Can you think of some?

When the predator concept is understood, introduce the light-up board to your class. Divide the children into two even "teams". Start with a member of one team and continue to give each team alternate chances to light up the board. A point is scored by each team-member who makes a correct match. If a wrong match is made, that student sits down. Once a match is made, that particular combination is not to be matched again during the same game. After the last match tally the score.

Be sure to allow time while you have the board for individual children to try their skills.

Activity 3

Using pupils to represent the components, construct models of two or three simple food chains and then convert them into a food web. Prepare six 12-inch cards lettered with such labels as sun, soil, green plants, mouse, grasshopper, earthworm, snail, frog, shrew, robin, garter snake, rabbit, owl, fox, goldfinch, sparrow hawk, etc. Prepare enough cards to supply about half the class; let the other half serve as audience. You will also need a ball of string which can be cut to convenient lengths and used to connect the links in the food web.

Assign a card to each pupil. Starting with the sun, connect it to green plants by asking the two pupils to hold a length of cord between them.

Now connect one of the plant-eaters to a plant; follow this with a meat-eater linked to a plant-eater. As the first components are added, cross-links begin to be evident and the food web concept is easily developed. At the outset is is advantageous to place the pupils representing the sun and the plants centrally, and then allow the remainder of the web to develop around them. Ask:

--Why is the sun necessary for all life?

--What is the source of food used by animals?

--In a natural environment, if all the members of a particular species such as grasshoppers, were removed from the food web, what would be the effect?

This point can be emphasized by removing the appropriate pupil from the model. As he drops his strings, have any students who had strings connected to the grasshopper drop their stings and so on around the ring.

Activity 4

Take the class out on your school campus. Have them make a list of all the animals that they can see in the schoolyard. Remind them that little things like ants and worms are also animals. In the classroom have them make a second list of the animals that they think might come out at night or that might visit the campus at other times. Assign one of the animals to each student and have him draw a picture of the animal and find out about its feeding habits. When the students have finished their drawings, have them begin to construct a food web of their campus on a bulletin board. Don't let them forget to include plants. Have them revise their food web from day to day as they continue their observations and research. Emphasize the importance of the sun, soil and plants in keeping the food web going.

Activity 5

Your students can build a miniature plant habitat and observe the food webs directly. A terrarium can be easily set up in a well lighted place that does not receive direct sunlight. Begin by placing a layer of gravel or pebbles in the bottom of an aquarium and then cover those rocks with about 2 or 3 inches of soil. Pick a Central Florida habitat that you would like to duplicate in your terrarium and collect small plants from that area. Plant the plants in your terrarium so that they are not overcrowded. Collect dead leaves, twigs, grasses, and maybe small rotting pieces of wood from the same area in which you collected plants. Spread the twigs, leaves, etc., in a thin layer over the exposed soil and, as you water your terrarium, this will decompose and form new soil. Relate decomposition in your terrarium to decomposition in the producer, consumer and decomposer cycle. Add some small animals such as crickets, ants, grasshopper, caterpillars, snails, earthworms, and a small chameleon or toad. Have the students watch the terrarium closely and then, based on their observations, have them construct a food chain for their terrarium. Discuss the terrarium with the class on a regular basis. Lesson 7, page 22, of Brennan's People and Their Environment, Grades 1, 2, 3, will also be useful.

Activity 6

Have pupils make lists of foods they ate during the previous day. The lists should be detailed and should include every type of food product used. Direct the discussion so that man's dependency upon the environment will be demonstrated.

--What plants or plant products are included in the list?

--What animals were used as food?

--What do plants and animals need to survive?

--Are any of your food sources threatened by pollution?

--Are food sources for animals threatened?

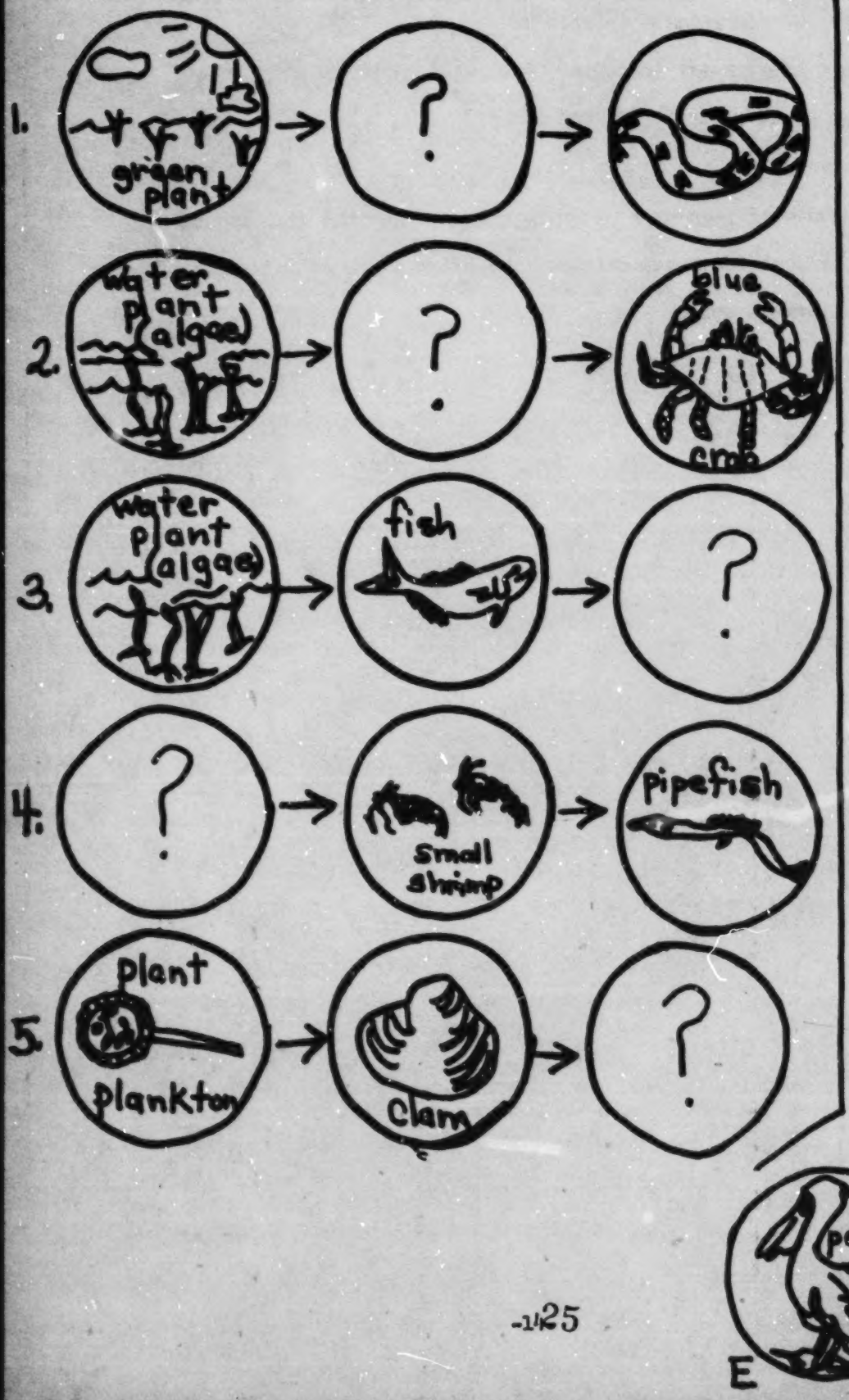
--If these food sources are in danger, what will happen to man?

--What can man do to protect his food supply?

Activity 7

Ditto the following page as a practice exercise for the children on food webs. The children cut out the five extra pictures and paste them in the correct web.

Practice Food Web



Fill-in Answers

A

B

C

D

E

Light-up Board

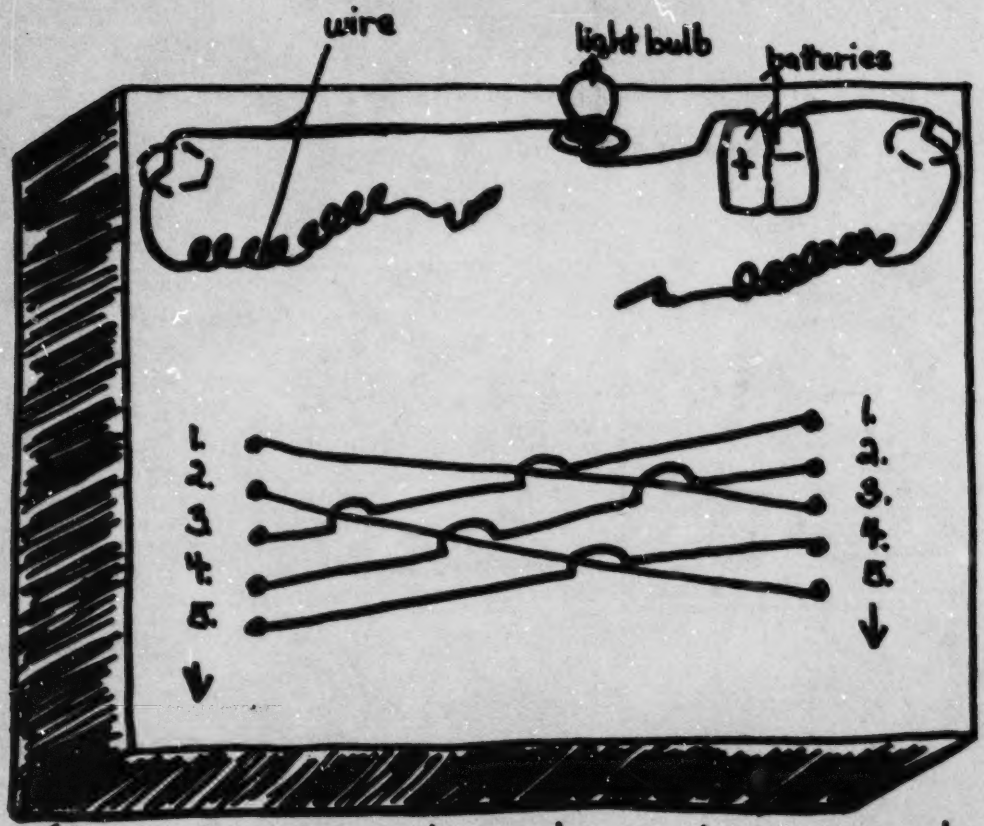


Diagram shows inside of top of box.

2 pinlight batteries

1 flashlight bulb

small coated wire

(lumps in wires show where wires cross but do not connect)

Directions for making the light-up board.

Build a box (wood, cardboard, etc.) or use an old game box already constructed, to house the unit. The lightbulb and loose ends of the wires, along with the terminals, are on the top part of the top board. The battery and the wires joining the terminals are on the bottom of the top board.

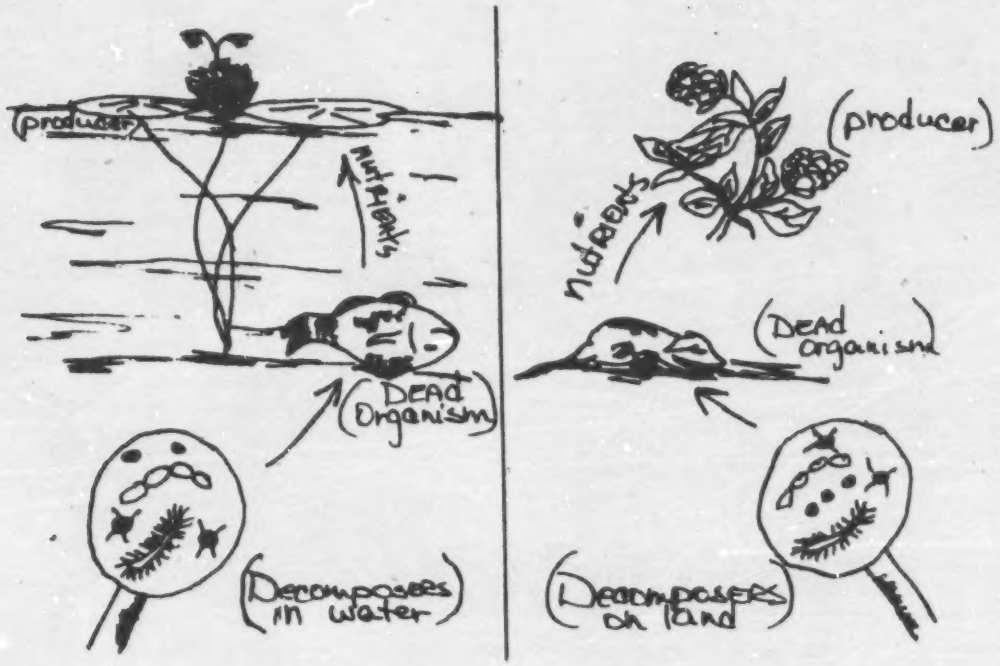
The board can be made of wood, using nails for terminals with the heads of the nails exposed and the points pointing inside the box. Wires can be soldered to the nails. The board can also be made of test board (perforated hard board) and the terminals can be test points. Wires can be secured by crimping (pressing together) or soldering.

Mini phone jacks can be used on the ends of the loose wires. The left wire is touched to one of the left terminals. When the right wire is touched to the correct right terminal the bulb will light, indicating a correct answer.

Most of the materials may be found at a hardware store at low cost.

Concept C

Decomposers are essential to the life cycle in that they decompose dead organisms and recycle nutrients to producers.



Activity 1

Have the students prepare a compost pile. The compost can be used later for gardening. Establish the need for decomposers and their recycling abilities. This point can't be overemphasized. Use Lesson 56 in Brennan's People and Their Environment, Grades 1, 2, 3, page 133.

Activity 2

Bring to class a section of rotting log. Invite the children to look for animal life. (A magnifying glass is very helpful.) If a rotting log is not obtainable, dig a section of soil from the forest area or under shrubs in the yard. Animal life which might be found include:

(1) worms
(2) grubs
(3) snails and slugs
(4) insects
(5) spiders, mites, ticks
(6) ants
(7) eggs of any of these.

--Why do you think these animals chose this rotting log as a home?
(A place to hide, food to eat, place to lay eggs, cool, moist, etc.)

--What is happening to this part of the log?
(Rotting, crumbling; lead students to understand that the wood is changing to soil.)

--In which part do we see more animals? Soft, rotting part, or hard part?

--Before this tree fell (or was cut) down and began to rot, what animals might have lived in it? (Birds, squirrels, tree frogs, insects, etc.)

--From the part of the tree that was cut down and made into lumber, what animal homes were (or could have been) made?
(Dog house, bird house, rabbit hutch, barn, chicken house, etc.)

--If there were no trees, would any of the animals have a place to live? What was necessary for the tree to have a place to grow? (Soil)

--Why is decomposition so necessary?

Activity 3

Fungi are plants that can't make their own food because they lack chlorophyll. They decompose organic matter to gain the energy they need and so they are called decomposers. They play a very important role in nature because they break down dead plants and animals and return the nutrients that were stored in these dead things to the environment so that new life may use the nutrients for growth. Emphasize to your students the important role of these fungi and then do the following activities:

(1) Let's find out where decomposers live. Have a campus hunt for decomposers. Have the students look for mushrooms, bracket fungi, stringy mats of white strands, etc., in dark damp areas on the campus. After they have found a few, have them decide where decomposers live.

(2) Do decomposers also live in the soil? If you have a microscope, have the students examine rich damp soil samples. Draw a picture

of a mycelial strand on the board to help students find them in the microscope.

(3) Have the students make spore prints from mushroom caps. Find and very carefully bring back full-grown mushrooms. Cut off the stems. Place each mushroom cap, gills down, on a piece of paper. Cover it with a glass or bowl so that it will not be moved or windblown. The next day lift off the covering and remove the cap with great care. The lines of the gills will show up clearly in a lovely, rayed pattern. Choose paper that will look best behind the spore print; white paper will contrast best against black spores, etc. If you want a more permanent print, first spray the paper with a clear plastic paint. Use broken matchsticks to hold the mushroom cap very slightly off the paper so that it will not stick. Or, you can spray the print with clear plastic. Hold the spray can back a good distance to keep from blowing the spores off the paper.

(4) Have the students make a drawing that will illustrate the important role of fungi and other decomposers.

Activity 4

Take your students to a shady spot near the school. There should be some small weeds and grasses in the area. Push a stick about the thickness of a pencil and approximately 10 inches long into the ground. Push an apple onto the stick. The stick will hold the apple so that animals cannot carry it away. Keep a daily record of the changes that take place. How long did it take before the skin was broken or for signs that animals had chewed on it? When did insects and worms appear? When did the first odors become noticeable? When did fungi appear? How long did it take for the apple

to completely disappear? What would happen if there were no decomposers?

Activity 5

Ask students to identify three items on the school grounds which are not changing. After students have compiled a list, discuss results. Ask what their choices will look like in 10 years, 100 years, 1000 years. Emphasize that there is really nothing that is not changing.

Concept D

Each member of a community is dependent on every other member of a community.

Activity 1

Study the local community through the use of love beads and a pantomime game.

(1) Start this activity by asking the class to tell what their fathers and mothers do for a living. As each new job is mentioned, list them on the chalkboard or on a large wall chart. Some children may not really be sure what their parents do; encourage these youngsters to try to bring the information to school the next day. When this list is finished, ask the children to add to it any other community members they feel important to their families. Your final list might look something like this:

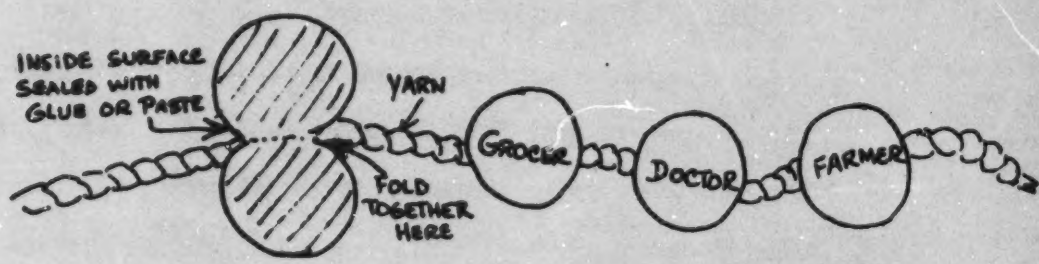
policemen	nurses	mechanics	painters
firemen	teachers	carpenters	electricians
shopkeepers	garbage men	lawyers	plumbers
bankers	exterminators	judges	factory workers
doctors	farmers	mailmen	road crewmen

lumbermen	housewives	cooks	secretaries
fishermen	cleaners	custodians	salesmen
			bakers

When your community list is complete, choose one member and discuss how other members on the list would be important to this one person. You should conclude the discussion with the thought that in some large or small way, each member of a community is important to all others.

The second phase of this activity is an Art activity, and it can be conducted on a day following the above-mentioned discussion.

(2) Have the students make love beads. These love beads are very simply constructed with variously colored construction paper and 33 inch lengths of yarn. Each construction paper "bead" should be about two inches in diameter, cut in a double fashion so that the yarn can be glued between the paper. (See illustration.)



It is highly recommended that about 10 oaktag or cardboard patterns be prepared beforehand to help the children make the beads. Each child would need to trace the pattern only once and then make his own pattern from that so that the oaktag patterns can be circulating rapidly. After cutting out his "beads", the list of community people prepared earlier will help the children label each "bead" on both sides with the occupation of a different person. Each child can make as many or as few beads as he chooses, but they should be reminded to evenly space their beads on their yarn. One extra large

central bead can be made for the student's name. This extra large bead can be used to hide the knot in the yarn and will demonstrate that the student is dependent on all of the other persons on the string.

(3) As a follow-up game for this concept, organize your class into two teams. The game is simple. Each team "huddles" and chooses a type of career or job they can pantomime. Once decided, team one faces the other team, who must remain behind a straight line (or other boundary marker). As team one proceeds with their pantomime, the second team tries to guess what they are doing. The first team may "venture" as close to team two's line as they dare, but when someone guesses correctly, team one yells, "Yes", and runs toward a safety line behind them with team two in hot pursuit. These two lines can be variable distances apart; anywhere in the vicinity of 50 feet is recommended. Next is team two's turn at the pantomime. Each time anyone is tagged before reaching his safety line, he must join the other team. When game time is over, the team with the most members is the winner. The fun of this game is definitely in the playing and not in the winning. If your class is large, it might be wise to start two separate games with a total of four teams playing.

Activity 2

Use the following lessons from Brennan's People and Their Environment, Grades 1, 2, 3, to help you illustrate this concept:

Lesson 35, "Cooperation of Families in a Community", page 85.

Lesson 36, "Cooperative Effort of People to Produce Food", page 87.

Activity 3

The following films may be used to expand the the concept.

-"Cities and Shopping Where We Get Our Food" - 301-1-033

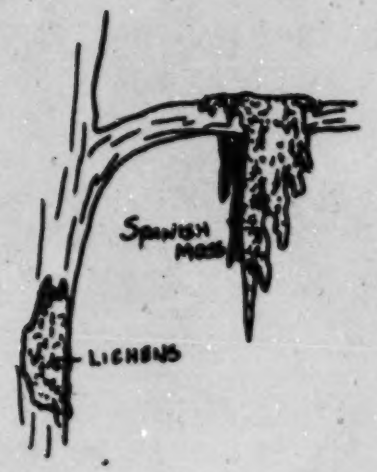
-"Growing, Growing" - 631-1-006

-"Where Does Our Food Come From" - 641-1- 003

-"Cities and Manufacturing Where We Make Things" - 301-1-030

Concept E

Many species are directly dependent on other species. (symbiosis)



(the Remora fish eats the shark's left overs)

Activity 1

Make or purchase a "light-up board", (directions on page 15) which is actually a teaching machine that signals correct responses with a battery-operated light. Also make a set of cards for "symbiosis". The cards will pair up in the following fashion:

Fig tree - wasps
termites - stomach protozoa
clover - nitrogen-fixing bacteria
water turtle - green algae
Yucca - pronuba moth
remora - shark
tree branches - Spanish moss
tree bark - Spanish moss
cattle egret - cattle
cleaner shrimp - fish
clownfish - sea anemone

Before you allow your students to use the light-up game, discuss what "symbiosis" means. (Have several children look the word up in a dictionary beforehand so that they will have their definition ready.) Symbiosis

essentially means two different species living together so that one or both partners benefit(s). Don't forget to study this "big word" itself - how many syllables? How many vowels? Is the "y" a vowel or consonant here? Etc.

Now call attention to the light-up board. Read all the cards on the board orally, briefly discussing what each plant or animal is like, but without directly revealing the symbiotic relationships involved. At this time break your class into two or more equal teams. Starting with the first member of team one, have that child attempt one match. If he succeeds that team wins one point. If he fails, he must sit down. (Only one try per person.) Each correct match can be made only 1 time per game. The teams will take turns at the board, and when the last match has been completed, the team scores are tallied. Naturally, the high score wins. The game will be meaningful only if, upon completion of each correct match, the teacher briefly explains the relationship involved. (This information is on the back sides of the cards.)

After the game keep the board available so that children may try their "luck" on a more extended basis during their free time.

Activity 2

Discuss the relationship between trees and Spanish moss with your students. Emphasize the dependence of Spanish moss on trees for their survival. Discuss the relationship between parasites and hosts with your students. Emphasize the absolute dependence of the parasite on its host. Now take the students out on the campus to look for examples of direct dependence. In each case discuss the dependence of one species on the other. Things that you might find on your campus include the following:

Lichens - Trees
Spanish Moss - Trees
Algae - Bark of Trees
Air plants - Bark of Trees
Insect Galls on Plants
Orchids on Bark
Aphids and Ants

Activity 3

Take the students out on campus and have them pick some living thing on which other living things are dependent. The students should write a short story or essay concerning how the dependent organisms would feel and react if the thing on which they are dependent were destroyed.

Activity 4

Have your students go outdoors and identify different objects and the interaction among those objects. Each student should pick some natural thing, and then compose a list of other things that interact with this chosen object. Example: Pine tree - sun, air, water, soil, birds, fire, insects, man.

Activity 5

Locate a tree on campus that has either lichens or mosses attached to it. Place tacks around the edges of the lichen or moss patch. How much growth has taken place? If possible, repeat the exercise on different types of lichens or mosses, on different types of trees, on lichen or moss patches that are growing at different compass points.

CONCEPTUAL SCHEME II

Heredity and environment interact to determine the characteristics of an organism and, therefore, a population.

When environments change living things must adapt, move or die.
ESTUARIES ONCE CHANGED BECOME CHANGED FOREVER WHY?
Pelican is not able to adapt to pesticides and may become extinct
GENETIC CHANGE CANNOT KEEP PACE WITH MAN INDUCED ENVIRONMENTAL CHANGE
drugs are one way man attempts to adapt to a hostile environment
natural areas provide relief from urban stress
broken arm heals
plants bend toward the light

CONCEPTUAL SCHEME II

Heredity and environment interact to determine the characteristics of an organism and therefore a population.

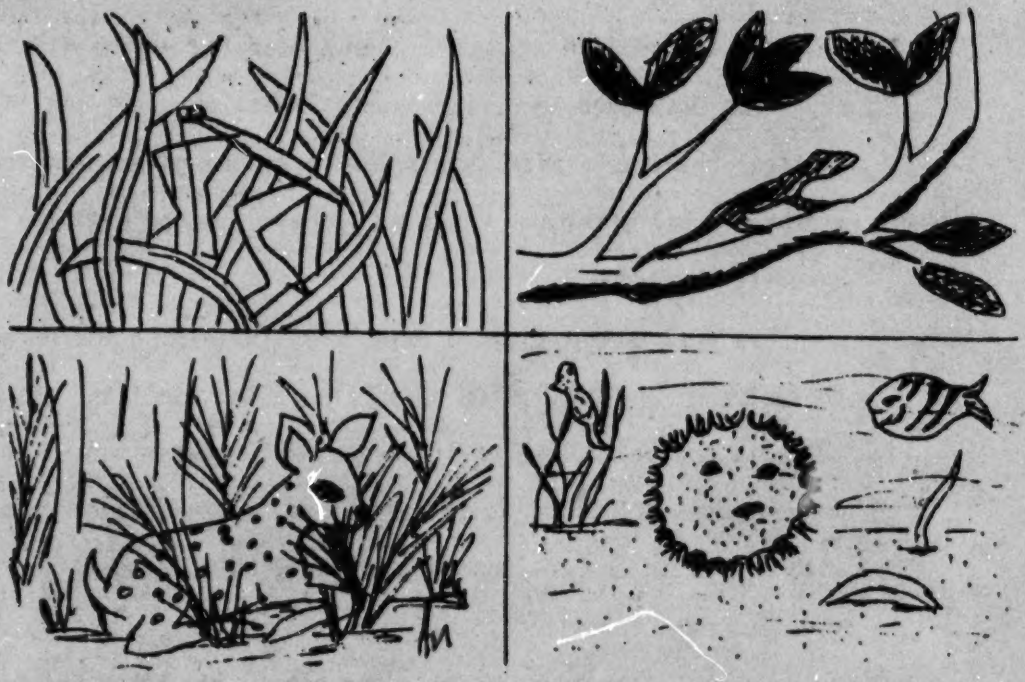
Why are you the way you are or a toad the way he is? As organisms developed in Earth history, their physical and behavioral characteristics were passed from one generation to another by genes through a system we have come to call the hereditary process.

The environment plays a major role in shaping the hereditary character of any population by sorting out those least fit to adapt to the prevailing environment. An organism whose genetic make-up does not allow it to live, feed, reproduce, or compete with others in the environment, will not be able to pass its genetic characteristics to a future generation.

On the other hand, animals and plants may alter the environment of an area to such an extent that the prevailing environment is changed, thereby, ultimately reshaping the hereditary characteristics of those who live there. Thus, heredity and environment are closely interrelated.

Concept A

The hereditary characteristics of an organism frequently protect it from predation (e.g. shape and coloration).



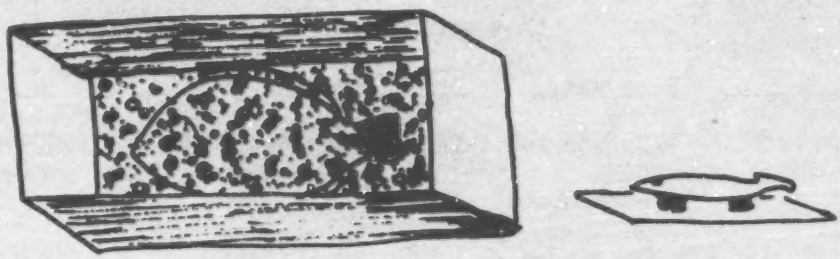
Activity 1

View films that show animal camouflage (films listed in Activity 5). Ask the children to distinguish between the animals that come already camouflaged and those which instinctively know how to create their own camouflage. (Examples of the latter are decorator crabs that affix bits of algae to themselves, sponge crabs that fasten living sponges to their exoskeleton, and sea urchins that hold broken pieces of shell or coral with their tube feet.)

Follow-up Activity:

Have each child bring a shoebox to school to use to make a diorama. Allow each student to choose a favorite animal from the camouflage films seen earlier. Have the students draw and color their organism and then cut it out. The inside of the box should be drawn and colored to represent

the usual habitat of the chosen creature. There should be little contrast between the animal and its background. Generally only the lower part of the box will be used. Unbent paper clips or cardboard tabs can be used to give the animal support and a 3-D effect against the background. Allow the children to use their imaginations in creating these dioramas, but check progress to be sure children don't forget that they are supposed to show camouflage. There is no reason that children should be prevented from "inventing" their own creatures and matching backgrounds. Some wild things can come of this. If shoeboxes are not available to all, or if a quicker project is desired, the 3-D effect can also be created against a simple flat paper background by using short 1-inch wide pieces of construction paper folded accordion-fashion to raise the animal off the background.



FLOUNDER

Activity 2

Collect a series of pictures showing various animals in their natural surroundings. Discuss the adaptations, such as shape and color, that allow the animals to blend in with their surroundings. Also, have the students collect pictures to place on a bulletin board.

Activity 3

The males and females of many birds differ markedly in coloration. Usually the male is brightly colored and the female is colored to blend in with her surroundings. Using pictures from magazines make a set of cards that the students can use to match male and female birds. In

many cases, of course, you can't tell the differences between sexes, while in others such as the red-bellied woodpecker and the kingfisher, only minor differences distinguish the sexes. Have the students discuss the coloration patterns of birds and how this relates to the bird's ability to survive.

--Can you find examples of brightly colored females and plain colored males?

Activity 4

Describe an area roughly 10 feet by 20 feet on the grass surface of the school grounds. Scatter 250 colored toothpicks around the area so they are not seen above the grass. Use 50 each of the colors red, blue, yellow, pink, and green. The students can pretend to be birds looking for insects while they try to find as many as they can in 3 minutes. Ideally, they will locate fewer green toothpicks than any other color. Then ask:

--Do you think that green insects have a good or poor chance of being overlooked?

--What does color do for insects?

--What insects and animals have a changed outward appearance at different times of the year? What does this accomplish?

Activity 5

These films may be used at the beginning of Activity 1:

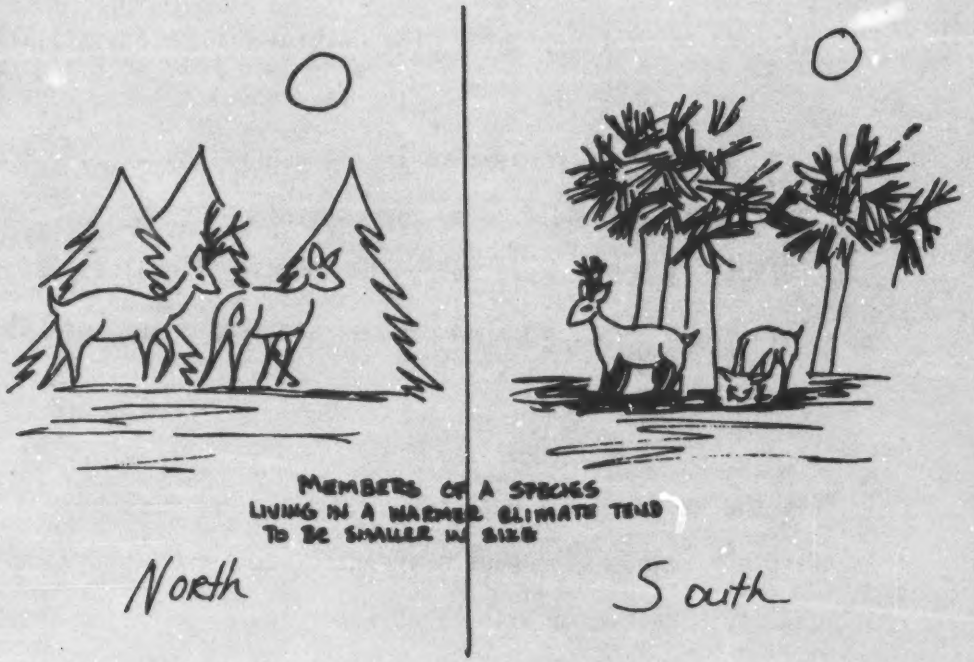
-"Looking Like What You're Not" - 591-2-016

-"Camouflage in Nature Through Form and Color Matching" - 591-1-033

-"How Nature Protects Animals" - 591-1-021

Concept B

The physical expression of many hereditary characteristics is modified by environmental factors.



Activity 1

Have the students grow two plants in separate pots. Have them fertilize one of the plants but not the other. Make sure all other conditions are the same for both of the plants. After a few weeks have the students examine the plants carefully. Discuss the implications of this experiment.

--Are the plants the same kind? (Yes) Did they inherit similar traits from their parents? (Yes)

--How do you explain the differences in the two plants?

(The lack of fertilizer is an environmental factor that restricts the "full" expression of hereditary characteristics.)

--Did heredity or the environment play the more important role in the growth of the plants? (Be careful. Heredity still played the more dynamic role in the germination of the seed and its subsequent growth.)

--Can you think of other examples of conditions of plants or animals that have been modified by the environment?

(Windblown trees, salt spray, too much or too little water, etc.)

--Plan other experiments to demonstrate the effects of the environment on plants or animals.

Activity 2

Take the students out onto the campus and ask each one to find an example of the environment's affecting the physical expression of heredity. Have them bring their examples back to you in about ten minutes or so. The students will probably bring broken twigs, leaves with holes in them, etc. Discuss each of the student's examples with the rest of the class. The material students bring to class could supply teaching activities for several weeks if you wished to carry the activity that long. (A discussion of the concept to help them understand it is a must before you go out onto the campus.)

Activity 3

Have your class wander around the campus locating such things as rocks, boards, bricks, and other articles resting on the ground. The students should try to answer the following questions. How do environmental factors differ between the area around the objects on the ground and under the object? (Light, heat, moisture, protection for animals, etc.)

How are the animals under the object adapted for this habitat? (Many are flat, some burrow in the soil.) How did the animals respond when the object was moved? What would happen if the object were left overturned? Why is it important to return the object to its original position? Thermometers can be used to determine differences in temperature. To check moisture differences, use the sense of touch.

CONCEPTUAL SCHEME III

Living things and environments are in a continuous state of change.

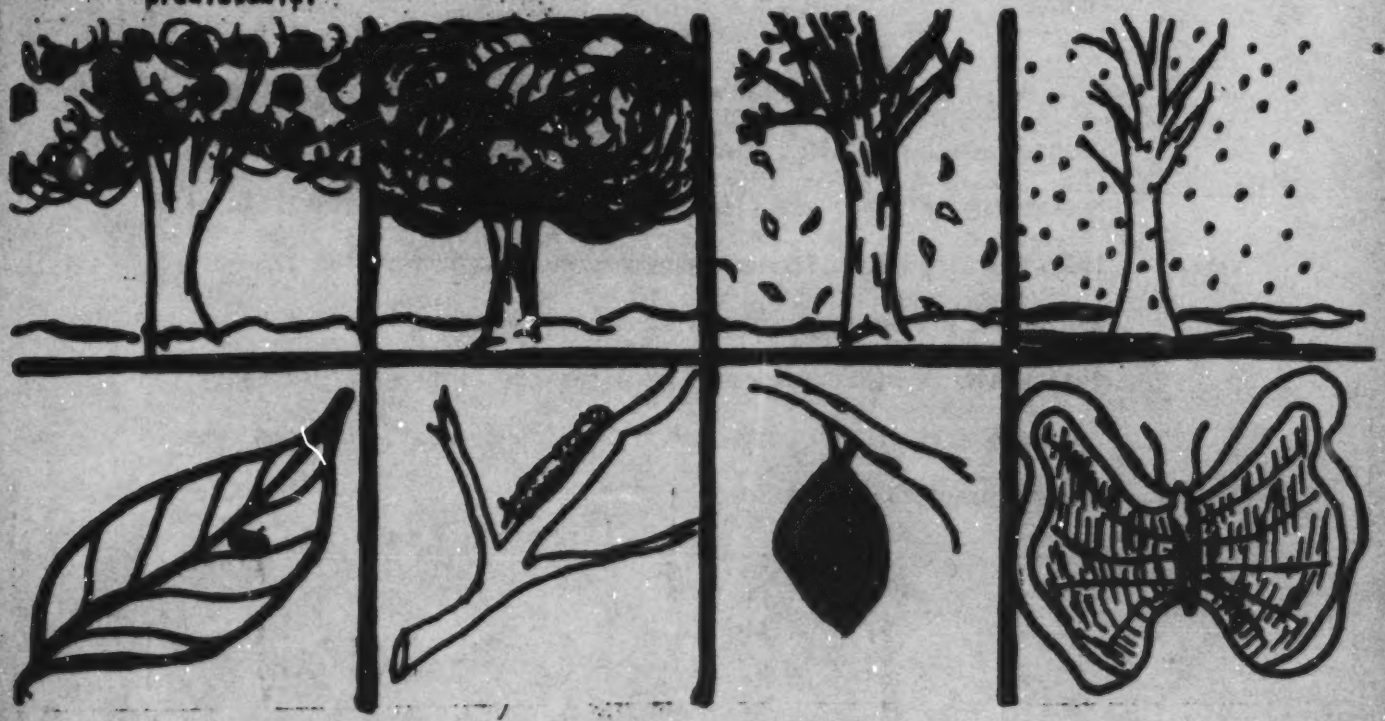
CONCEPTUAL SCHEME III

Living things and environments are in a continuous state of change.

All living things and environments are involved in natural changes which we call cycles. These cycles may be growth, reproduction or other aspects of the life cycles characteristic of the natural world. Some changes may be of a non-biological nature. Since nothing on earth is static in its make-up, location or relationship to other things, a mere passage of time marks change in environmental systems, whether it be life or death in a food web, or uranium decaying to lead.

Concept A

Since natural changes usually follow a regular pattern, they are predictable.



Activity 1

Take your students out on the campus to look for examples of predictable change. Though many changes are constantly occurring in the environment, not all of the changes are easily predictable. Many changes, such as seeds germinating, are regular and predictable. Emphasize this point with your students. Other examples of predictable change might include: growth of organisms, the various stages and changes in the life cycle of a butterfly, resurrection fern turning green after a rain, leaves falling, bark shedding from certain trees, death of plants in a heavily used section of the campus, grass grows slower in winter, etc. Do not give these examples to your students before they go outdoors, but do discuss the concept with them. After each student has returned with an example of a predictable change, let the students tell about their finds. Guide them in the right

direction through questions. Emphasize the usefulness of recognizing predictable change in our environment. Bring out the idea of man-made changes and what things can be predicted when man makes these changes.

Activity 2

In order to begin to develop an understanding of succession, change and diversity in nature, children should become aware of the variety of living and non-living things in a particular natural area. Have several children obtain hoola hoops or large hoops made from wire hangers. These should be tossed onto the school grounds or on the grassy surface of a park. Each group should then list the living and non-living things found within the perimeter of the hoop. (Forest areas, pastures and lawns can also be used in this manner and the results compared with the school grounds or park area.) This count or listing of the things observed in any area gives a picture as unique as a thrmbprint and a feeling for the wide variety of things that make up any part of the environment. Have them carefully mark the area that they placed the hoop over. After a few months have them go out and re-examine the area and search for changes that have occurred.

Activity 3

Use Lesson 43, page 101, "Dinosaurs", from Brennan's People and Their Environment, Grades 1, 2, and 3.

Activity 4

Show and discuss the filmstrips:

-Life Cycle (National Geographic) - Includes Mammals, Fishes, Birds, Amphibians and Reptiles, and Insects. (Available - Largo C. & I. Building)

Show and discuss the films:

-Seasons - 525-2-004

-Seasons of the Year - 525-1-010

-Butterfly Mystery - 595-1-011

Activity 5

Have the class develop a bulletin board display which illustrates various types of environmental changes. The class may be divided into two groups: the first to work on environmental changes caused by nature; and the second, to work on environmental changes caused by man.

Activity 6

Collect pine cones from the campus trees or have students bring in pine cones. Remove the pine seeds from the cones. Prepare a soil bed and plant the seeds. Transplant the young trees to different areas of the campus. Invite a forester to speak to your class about pine culture. If possible, do the transplanting or seed planting on Arbor Day.

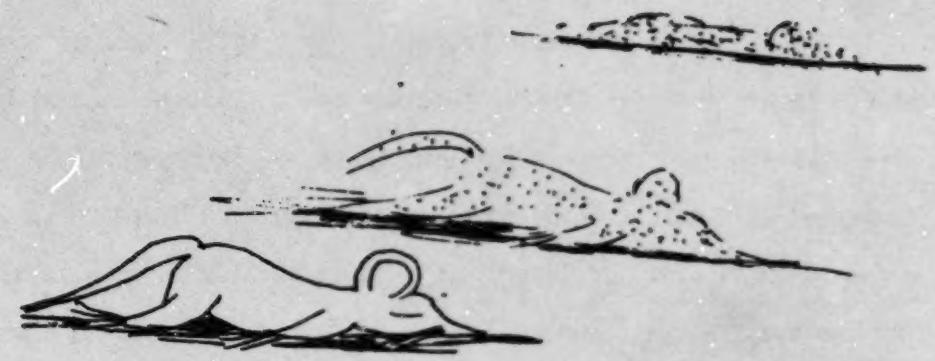
Activity 7

If deciduous trees are available to you on your school campus (cypress, red maple, etc.), it becomes an excellent project to make a photographic record of the tree through out the season, as its leaves develop, reach maturity, and eventually fall. Utilize the same stake or fencepost for your camera to better insure the identical angle each time photo is taken.

Concept B

Decomposition is a regular and, therefore, predictable form of change.

(Compost pile)



Activity 1

Make a compost pile which the students can use in planting a garden later. Compost, vegetation decomposed by bacteria, is one of the best types of soil builders that can be used in a garden. It is also the most inexpensive, because otherwise useless waste materials are being recycled. Explain to the children that a compost pile is much like a factory. The workmen are, of course, the microscopic bacteria or "rotters", producing a material that can provide plants with almost everything they need in the soil.

With the students' help, select a flat out-of-the-way location, preferably within range of a watering hose and in a shady spot. Florida's heat will keep the microbes busy working most of the year, but they need moisture to work best. (Ask your students why this is true. They should remember that all living things must have water.) One word of caution - do not start the pile against a wooden building. A compost

pile will look neater if contained in a shallow pit or against two or three cement blocks, or chicken wire walls about 2 or 3 feet high surrounding a 4 or 5 square foot area.

Leaves, pine needles, weeds, vegetable garbage (from the school kitchen), and lawn clippings can go into the pile. Begin the pile with a 4" layer of leaves and other vegetable material. Next add a layer of soil to help hold moisture and minimize the tendency for the material to blow away. Make several layers in this fashion. Each new layer should be thoroughly sprinkled with water. Lime or plant food may also be added to speed decomposition (a pint per layer). This "artificial manure" will be ready for the next season's garden. While you are constructing the compost pile, lead frequent discussions on decomposition and composting. Take the students out to examine the pile several times during the school year. Lesson 56, page 133, "Leaves and Their Value - The Compost Pile", in Brennan's People and Their Environment, can help you organize this activity.

Activity 2

Have students collect scrap paper from the campus. Do not keep waxed or plastic coated paper. Tear the paper in very small pieces, the smaller the better. Soak the paper pieces in the water for one hour. Beat this mixture with an egg beater until it becomes creamy. Add one tablespoon of cornstarch per gallon of mixture. Pour the mixture through a piece of window screen. Force the mixture through the screen until approximately one sixteenth of an inch of pulp accumulates. Next set the pulp covered screen on several layers of newspapers. Cover the pulp with a plastic bag and press down. This will force excess water out of the pulp. Replace the newspapers as needed. Allow

the fibers to dry for 24 hours and then peel the recycled paper off the screen. Have your class use the paper for art projects or as backing for pressed leaves and flowers.

Activity 3

Show and discuss the film:

-"Life on a Dead Tree" - 574-1-004

Activity 4

On a campus or field trip, the children could observe and discuss the changes taking place on a dead tree.

-The following may help the teacher in the discussion of things that are taking place on and within the tree.

There are physical and chemical changes which accomplish the destruction of the tree and the remains of the tree become a part of the soil. In case of the rotting log the changes may begin while the dead tree is still standing. At that time certain insects and other small animals may inhabit the bark and the outer wood. Birds and mammals may use the hollow parts for nests. The tree finally falls to the ground after being weakened by the boring insects and the rotting effects of bacteria and fungi. The bark is probably already off, and the first inhabitants of the tree will now be replaced by new ones. The wood will be further riddled with boring, and more fungi may gain entrance to the inner parts of the wood. The plants and animals change the wood until once again, a new kind of community is found in the log. Now, the inside of the log may be "punky", while the outer shell is firm. Soon, the outer shell disintegrates and the log becomes part of the forest floor, but still plays host to many small organisms. These will finally disappear as the log is completely decayed.

CONCEPTUAL SCHEME IV

As a population increases, its effects on the environment become more pronounced.

ENVIRONMENTAL STRESS

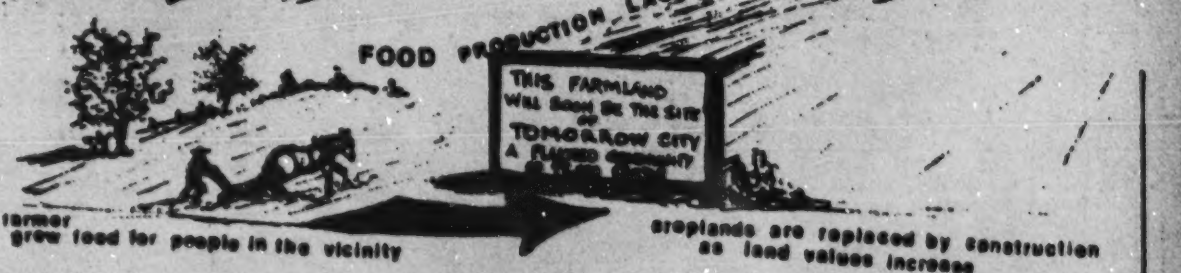
OCCURS WHEN DEMANDS ON ENVIRONMENTAL SYSTEMS RESULT FROM INCREASED POPULATION DENSITIES

- resources become stressed
- individual freedoms & choices become limited
- living costs & taxes increase

FREEDOM OF CHOICE AND ACTION BECOME LIMITED

TERRITORIES BECOME SMALLER AND DEFINED

ALL NATURAL SYSTEMS HAVE CHECKS



farmer grow food for people in the vicinity

croplands are replaced by construction as land values increase

Increasing populations stress food supplies and resources at a faster rate than the population grows because each new generation demands a higher standard of living than its predecessor.

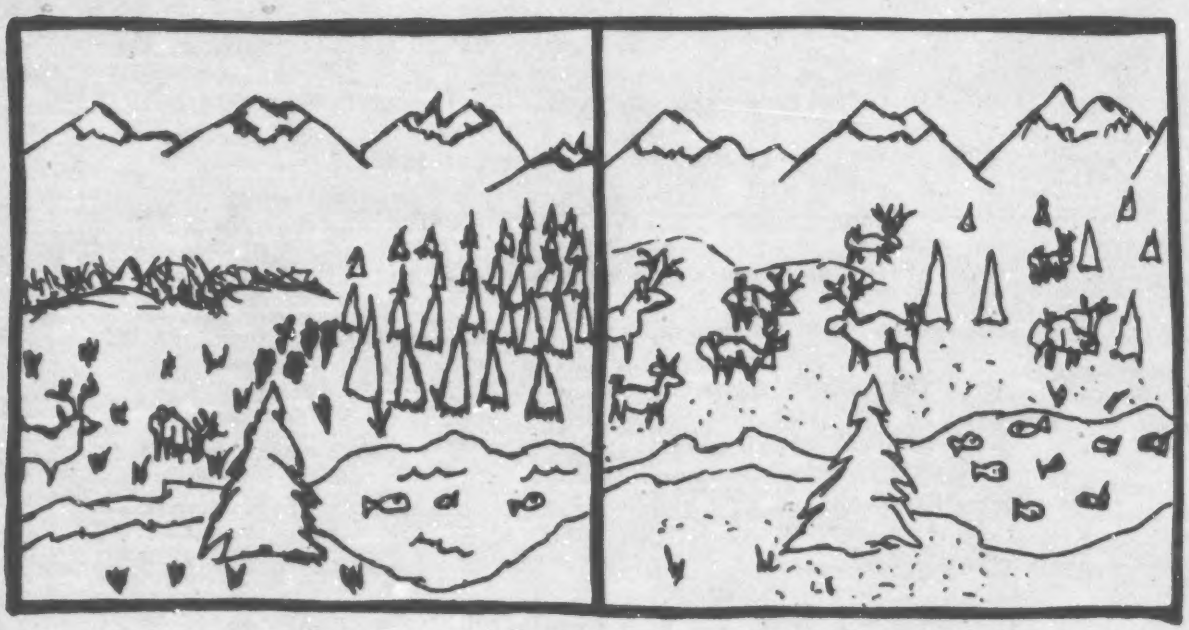
CONCEPTUAL SCHEME IV

As a population increases, its effects on the environment become more pronounced.

As a population expands it approaches a limit known as the carrying capacity of the environment. The environment is only capable of supporting a finite number of individuals and, if that capacity is exceeded, the environment will not supply the needs of the surplus individuals and they will die. When the population levels are near the carrying capacity of the environment, individual members of the population will receive only their minimal requirements for life. This fundamental ecological principle applies to man and also to the quality of life that we enjoy. Our planet has finite resources and as the population expands those resources will be distributed to individuals in ever decreasing allotments. Thus, as man's population grows, his standard of living will be reduced.

Concept A

Density is an expression of the number of plants or animals per unit area.



Activity 1

Have a classroom discussion about the meaning of density in the sense of the wildlife theme. Stress the fact that the overpopulation of an area can be the destruction of that area. Have the children create their own pictures that express their idea of density and the opposite "roomy" or "open". Different pictures can be created with different types of materials. Prints can be made with linoleum blocks, but potato prints are recommended for the third grade. Potato prints can be made by cutting a potato cleanly in half and cutting away the unwanted parts of the design. Another newer method is to use the flat styrofoam trays used by grocery stores to package vegetables and meats.

Once the sides are cut off, and design drawn on the flat surface, a teaspoon can be used to indent the areas outside the design. In any case, heavy tempera paint applied with a brayer will suffice for ink in place of special block-printing inks. (If brayers are unavailable, the design can be gently pressed onto a plastic sponge holding tempera paint.) Be sure to encourage wildlife themes, such as bugs, worms, birds, flowers, fish, etc. Next give each child an 8 x 10 piece of construction paper that will complement the color of the paint, and have them fold their paper into halves. On one half they will print many times, evenly filling the whole side. On the other half have them make 1 or only a few well-spaced prints. Have them label the crowded side "dense" and the other side "open" or "roomy". When everyone is through, have a count taken to see which person created the situation with the greatest density.

Activity 2

On the school grounds students find as many examples of <u>living things' reproducing</u> as they can locate. Compose two lists, one for animals, another for plants. Common examples for animals are eggs of insects beneath boards, young spiders near web, insect cocoons beneath the eaves, bird nests, etc. Plant examples may include the presence of seeds, or seedlings, etc.

Activity 3

Have your students go to a campus area that has relatively natural growth on it. Weed patches in ditches or along fences would be appropriate. The students should imagine this area as a plant society. Students should compare this society with their own community. Is there any order to this society? What members of the society seem to be dominant? How are some members dependent on others? Would this area be able to become a dense area easily?

Activity 4

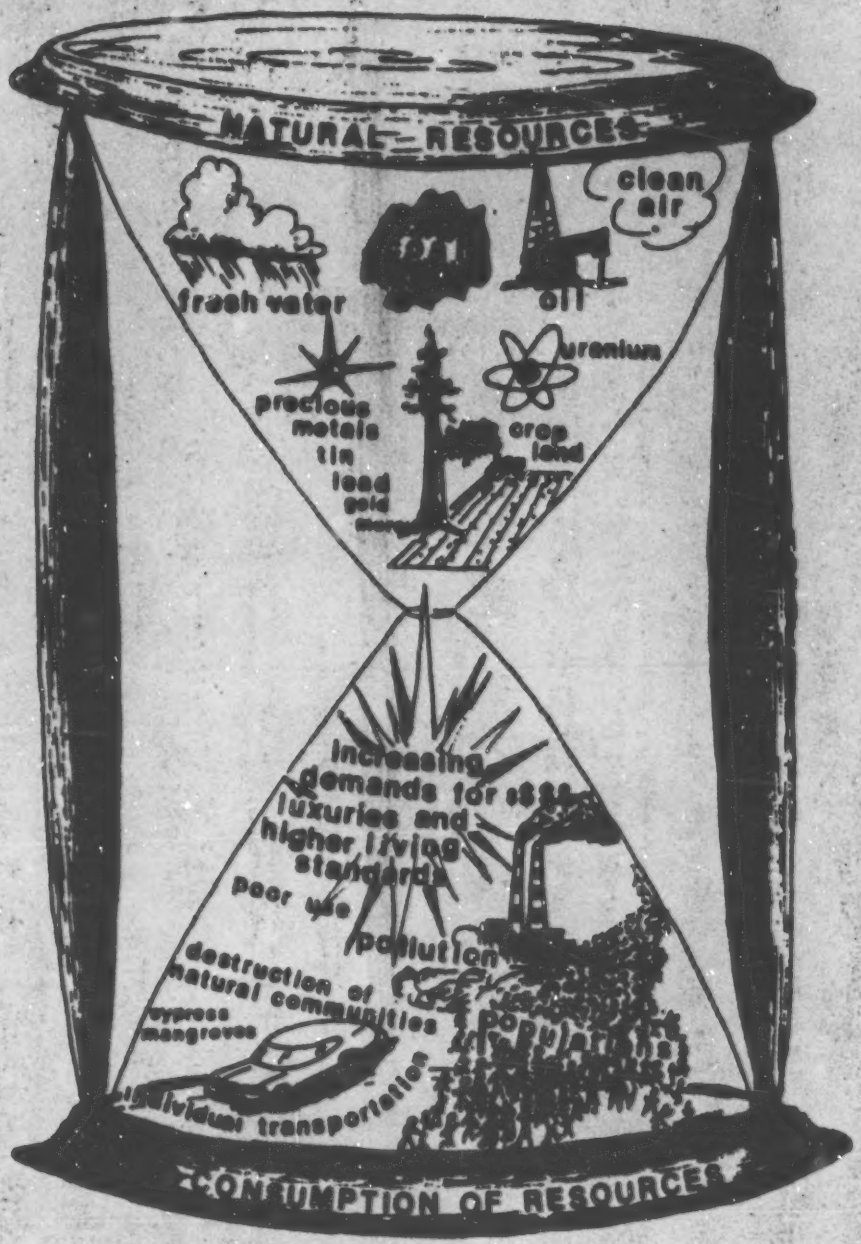
Have your students estimate plant populations by using transects. This activity works best in overgrown areas of the campus such as ditches, and along the edges of the school grounds. Divide the class into small groups of two and three. Each group should make a rough map of the study area by pacing off measurements. Give each group a piece of string that is long enough to stretch across the study area. The string is the transect line and should be securely fastened at both ends. The students should move down the transect line and determine which plant is most numerous within two feet of either side of the string transect. The name of the plant is not important, but, if it can be identified, use the name; otherwise, designate it as plant "A". Record the number of this type of plant along the transect. Do not count grasses. The first transect should be made along one end of the study area. Now move the transect line approximately one-fourth the total distance of the study area from its first position, and the count should be repeated. Continue to move the transect line one-fourth the total distance of the study area until four transects have been made. To obtain an estimate of the total number of the sample plants within the study area, use the following procedure:

1. Determine the total area of the study area;
2. Divide the entire study area by the total area of the transects; (to get the area of one transect, multiply width of 2 feet times length of the transect.)
3. Determine the average number of the study plants in the 4 transects.
4. Multiply the average number of plants in the 4 transects by the answer to step #2. This product is the estimate of the total number of plants within the study area.

How did the different groups compare? How would you determine the second and third most abundant plants?

CONCEPTUAL SCHEME V

We live in a world of finite resources and almost infinite demands on those resources.



Resources may become finite

(a) if there is only a limited supply, e.g. oil, and we consume it;
(b) if man misuses a renewable resource, e.g. air, water, forests, soil, estuaries, fish, so that it is totally changed by pollution or misuse and no longer can renew or recycle itself to be used again by man.

CONCEPTUAL SCHEME V

We live in a world of finite resources and almost infinite demands on those resources.

Many of our natural resources, particularly mineral resources and energy resources, are finite. There is only a limited amount; when they are gone they will never be replaced. In addition, man has made many of the world's renewable resources finite by his mismanagement of the resources.

Many of our resources which depend on cyclic patterns to replenish themselves have been altered by man. When man consumes more of a resource than nature is recycling, he upsets the cyclic pattern and produces a situation whereby the resource becomes finite. There will be a time when the resource is consumed and the cycle breaks down because it can no longer replenish itself.

We see this in many life cycles; from bacteria in our soil which convert nitrogen, carbon and sulfur to usable products, to our ever increasing endangered wildlife species and mineral and natural resources, e.g., timber and fisheries. These resources are being harvested or interfered with by man's technological needs.

Concept A

As it provides a great deal to man's quality of life and plays an essential role in the environment, wildlife is one of our most important natural resources.

Activity 1

Make or obtain a set of cards on local wildlife. These could include a set on local mammals, another on birds, and a third on native trees. Play games to help the children learn to recognise, to name, and identify the habitats of our local wildlife. These types of games are valuable learning exercises and still allow the children to have a great deal of fun.

Activity 2

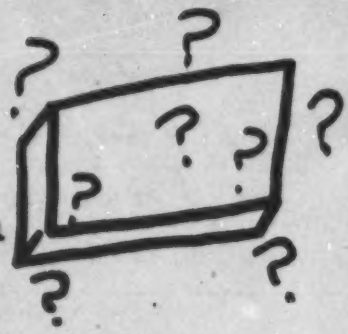
Ask your students if they know what kinds of mammals run around the school grounds at night. There are, of course, many small animals around which might include: mice, rats, gophers, squirrels, shrews, moles, opossum, or even raccoons. Make or obtain three different sizes of live traps.

Demonstrate the use of these traps for your students and emphasize to them that the animal won't be hurt in the live trap. Bacon and/or peanut butter make good baits for the traps. Take your students onto the campus to look for likely spots to small mammals. This should be done in such a way that the students theorize about good spots and then can confirm or reject their theories on the basis of trapping results. To minimize trap loss we suggest that you place the traps after school so students don't know where they are. Do not touch or handle trapped animals. DO NOT LET STUDENTS HANDLE CAGES WITH ANIMALS IN THEM. Small mammals may be dumped into large glass jars for short-term investigation. Do Not Attempt to Transfer Large Mammals into other cages. Let the students observe the mammals in the classroom. Have the students draw pictures and do a short report on each of the mammals they catch. The student reports can be used to make a book of the animals around the school. After an hour or two you should release the animals in the same spot you caught them. Do not release larger mammals when students are around.

Activity 3

Make a bird feeder and nesting material station. Use one gallon plastic milk jugs (recycling) and let the students design and make bird feeders. The best feeder can be used at school and the the others can be used at home. In the spring of the year it can be great fun to make a nesting materials bag. Obtain a plastic mesh onion or potato bag and stuff it full of nesting materials such as the following: string, wool, thread, strips of cloth, (these materials should be cut 6" or 8" long to avoid strangling the birds) bits of fur, hair, downy feathers, absorbent cotton, lint, natural fibers such as thistledown, grass clippings, strips of cellophane, frayed rope fiber, and very small twigs. Have students keep track of the kinds of nesting materials the various birds remove.

Activity 4



To introduce the use and value of field guides to your students, collect boxes with lids to play the "mystery box game". Into each box place 1 or several "unknown" nature items or pictures of nature items. Also place a field guide in each box that will allow the students to identify what is in the box. For example, in one box you might have three different shells or other beach treasures, along with a seashore guide book. In every case, ascertain beforehand that your mystery items are described by pictures in each guide. Reading should not be necessary for the identification. When you are ready, place the boxes around your room and give each box a station number. Divide your class into enough small goups so that each station has a group and assign each group a starting station. One person in each group can be the "secretary" who will record the names of the mystery items found at each station. Give your groups about 10 minutes at each box and then call "move" and have them rotate clockwise to the adjacent station. The group with the most correctly identified items will, of course, be the winning group. Shells, easily identified rocks or mineral specimens, wildflowers, tree leaves or needles, mammal pictures, insects, fish pictures, reptile pictures, and bird pictures are good mystery materials. A variation of this game helps students learn habitats. In each mystery box, place 3 or 4 animal or plant pictures that are characteristic of a particular habitat, and see if your students can guess the habitat (e.g. alligator, cypress trees, cardinal plants, red-eared turtle, and otter would suggest a cypress swamp). In place of pictures, word cards could be used to represent plants, animals or conditions such as "salt water" or "fresh water". Some typical Florida habitats are the sawgrass Everglades, Mangrove estuaries, pine flatlands, beaches, and mudflats.

Activity 5

Go on a pretend camping trip in which, to your surprise, no wildlife is seen. Discuss what a camping trip without animals would be like. (No birds to awaken you each morning; no fish to catch for dinner; no funny squirrels to watch; no raccoons to go through your food box at night; no ants to discover your sugar, etc.) You will probably conclude that wildlife is an essential part of the enjoyment of a camping trip. Strive to make your children aware that man is the "guest" while camping. Although wildlife might cause you some inconveniences at times, man can also upset things for the wildlife. (Noise, trash, fires out of control, pollution of lakes and streams, cutting down bushes and trees for fire wood or tent space, and picking berries or other fruit that the animals would otherwise eat.) Perhaps if the children pretended they were a mouse, raccoon or other animal living at the campsite, they could better understand the animals' side of the picture. As a follow-up, have the children draw a large tent on a piece of manila paper and fill the tent with the names or pictures of things they would take on an overnight camping trip. You will find most children very enthusiastic about camping, perhaps you can devote some class time to the youngsters who would like to share the details of a "special" camping trip they once had.

Activity 6

The following activities from Brennan's People and Their Environment, Grades 1, 2, 3, will be useful in developing this concept:

Lesson 29, "Animal Homes", page 70.
Lesson 38, "Friends in the Garden", page 91.
Lesson 41, "Wildflowers", page 96.
Lesson 42, "Conservation of Wildflowers", page 98.
Lesson 45, "Birds", page 107.
Lesson 46, "Wildlife Conservation", page 109.
Lesson 48, "Forest Conservation", page 114.
Lesson 53, "Wildflowers", page 125.

Activity 7

The following filmstrip is available from Largo C. & I. Building:

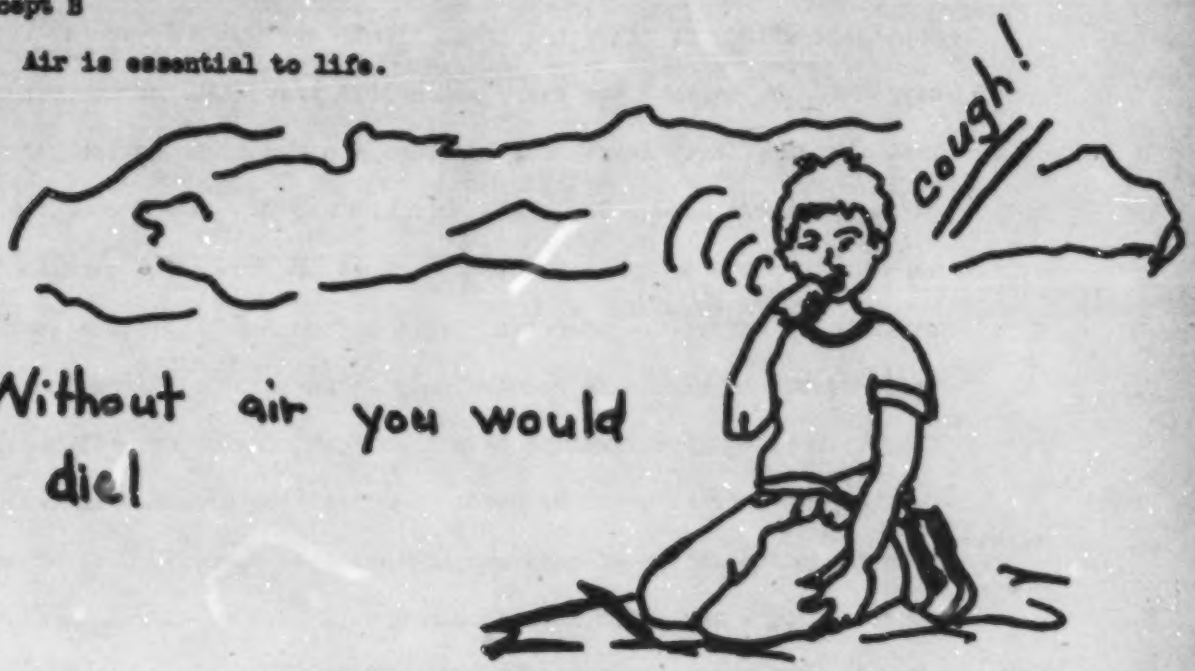
-Animal Behavior - National Geographic

The following films can be used to expand the ideas presented in this concept:

-Our Animal Neighbors - 591-1-012
-Nature's Half Acre - 591-2-017
-Butterfly Mystery - 595-1-011
-Insects First Film - 595-1-019
-Tad the Frog - 597-1-012
-Looking at Fishes - 597-2-002
-How Birds Help Us - 598-1-008
-Looking at Reptiles - 598-2-002

Concept B

Air is essential to life.

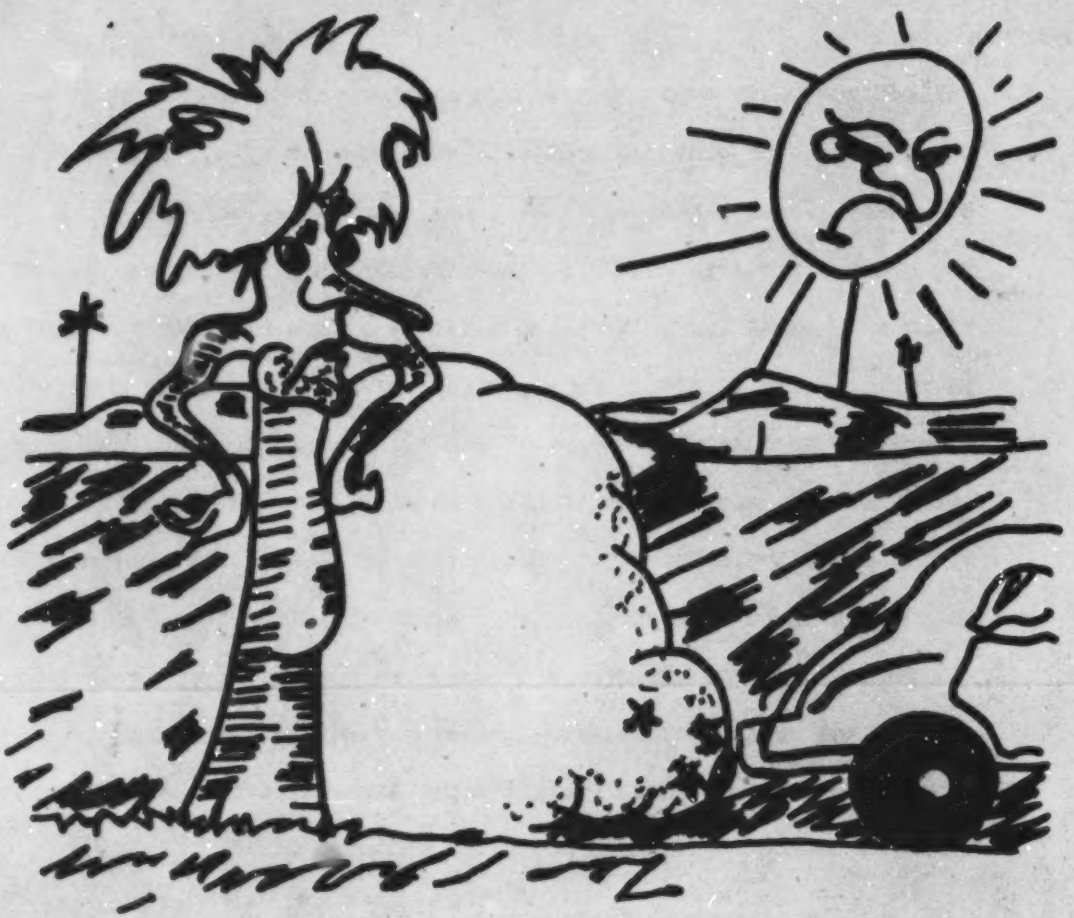


Activity 1

Collect some city-type pictures and another set of country pictures. Try to find city pictures that will show sources of air pollution; e.g. cars, trucks, busses, smokestacks, airplanes, incinerators, etc. The country pictures should include forests, open fields, barns, and plant and animal life. Have the class study the pictures and find air polluting sources in both sets, which you will list on the chalkboard under the two headings, "Country" and "City". In the end, the city list should be much longer than the country list, this explaining why cities are often so smoggy. These pictures can then be used on a bulletin board with large construction paper arrows pointing to any source of air pollution. The children can carry the activity ever further by cutting country and urban pictures from magazines and arranging them in two sets in collage fashion. Small bright paper arrow tips can be used on their collages in the same manner as on the bulletin board.

Activity 2

Emphasize with your class how green plants are the only source of oxygen on the earth. For every automobile that emits carbon dioxide into the air, fifty large healthy trees are needed to restore the oxygen that was used. The class should study the school grounds, working in pairs or small groups and count the number of cars in the parking lot versus the number of trees on the school grounds (small trees or shrubs should be counted only as parts of a "large healthy tree"). Do the school grounds have an oxygen surplus or deficiency? How many more trees would be needed to create an oxygen balance? Discuss the added effect of cars driving past the school. Have students suggest from a map which local areas should have an oxygen surplus to compensate for the reduction in their area.



Activity 3

Have students prepare charts or posters concerning problems of air pollution. Illustrate such ideas as:

a) Automobiles contribute heavily to air pollution.
b) Air pollution can be a health hazard.
c) Pollution will affect man's way of life.
d) We must continually strive to curb and eliminate pollution.

Some questions for guiding the information-gathering activities of the children can be found below:

--What are the main pollutants of the atmosphere?

--Can you smell air pollutants?

--What are some reasons why the air above cities is more polluted than air over the open countryside?

--To what extent can an individual prevent air pollution?

--What are some steps your government can take to prevent or fight air pollution?

--What steps could large industries take to stop pollution?

Activity 4

Use lessons from Brennan's <u>People and Their Environment</u>, Grades 1,2,3,. Use Lesson 34, "Air Pollution", page 82, and/or Lesson 51, "Air Pollution - Smog", page 119.

Activity 5

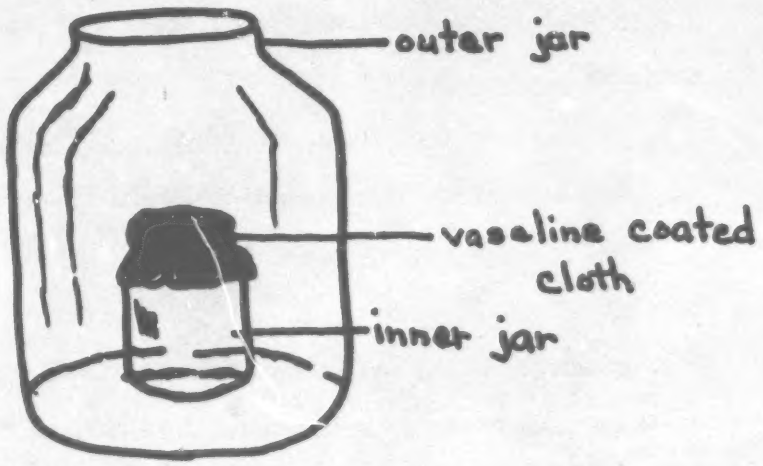
Obtain from the Gulf Coast Lung Ass. Inc. the film, "The Run-Around", and show it to your classes. This cartoon is available by calling 347-6133 or writing, Gulf Coast Lung Ass. Inc., 6160 Central Ave., St. Petersburg, Florida.

Activity 6

Show and discuss the filmstrip "Our Air", from <u>Pollution</u> Coronet Sound Filmstrip Series. This is available from Elementary Curriculum, Martin Rainey, Harris Elementary Center.

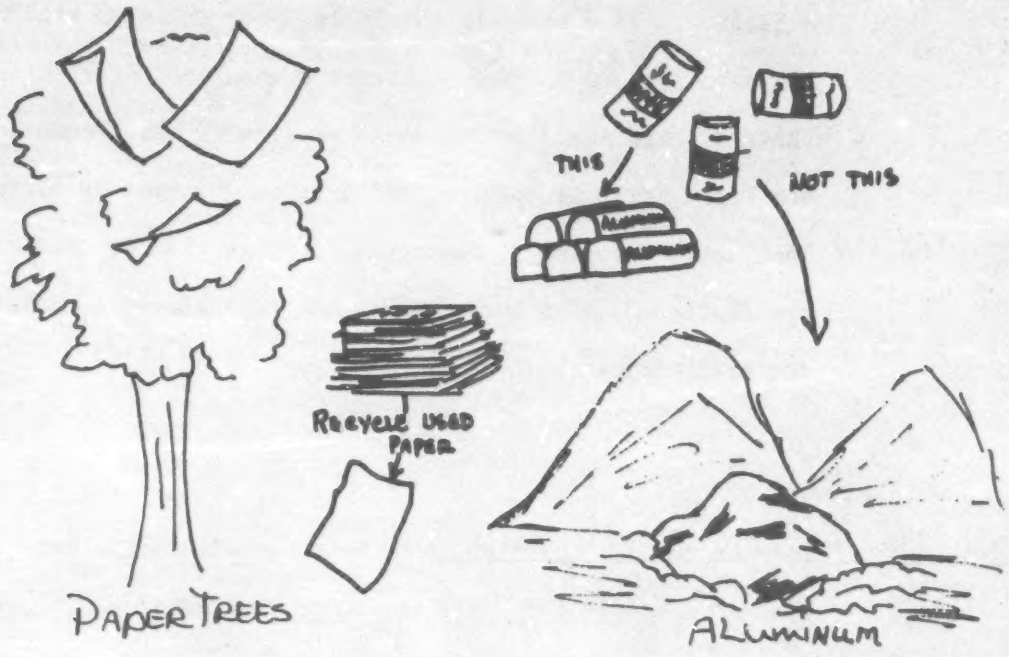
Activity 7

Obtain two clear glass jars, one large and the other one small enough to fit inside the first. Smear vaseline jelly over the top side of a small piece of clean white cloth and cover the smaller jar's opening with this cloth held in place with a rubber band at the neck. Now place the smaller jar into the larger jar (which will act as a wind shield) and take the class on a walk around the campus to find an open, yet undisturbed, safe place to set the jars. Give each child a chance to look at the vaselined cloth before leaving it. In 3 or 4 days return the jars to the classroom, remove the cloth and lay it on white paper. There should be evidence of air pollution, the degree depending, of course, upon your school's location. (This experiment is not recommended during the rainy season.)



Concept C

We must recycle our resources to keep from exhausting them.



Activity 1

Display in the classroom examples of our modern, throwaway containers; a soft drink can, a soda bottle and a cardboard milk container. Have the students discuss what happens to these articles after they are discarded. Emphasize for the class that nature has its own recycling process in that materials, in one form or another, are used over and over again. Man uses many things only once and then discards them, often in a non-degradable form.

--Why do our products seldom come in reusable containers any more?

--Of what materials are reusable containers and discards made?

--Do these materials readily return to their sources?

--How are we hindering nature's process of recycling?

--How can man reduce the amount of waste he produces?

--What can individuals do to limit waste?

School children could collect aluminum cans around the school or at home. The children could weigh the cans to see how much they have collected. If a scale is available, your children will discover that it takes from 20-27 cans to make a pound, depending on the average brand. (Have a child stand on the scale as another child adds cans to a bag the first child is holding, until he weighs exactly one more pound. Then count the cans.) Fewer plastic bags will be needed if the cans are flattened. The bags of cans can be taken to a pick up point for aluminum cans.

Activity 2

Use Lesson 37, "Learning to Be a Conservationist", page 89, from Brennan's People and Their Environment, Grades 1, 2, 3.

Activity 3

Organize a class-sponsored clean-up of the school grounds. After the students have participated in this anti-litter campaign, have them compile a list of the common forms of waste found, and discuss how this litter could have been recycled. A number of manufacturers are offering bounties for their containers when returned in quantity after each use. An interesting project might be to contact one such company, learn the details and embark on a money-making venture by collecting these containers for cash. Profits from this effort could be used to sponsor a modest community environmental improvement plan.

--Why do people litter their environment?

--Knowing this, are there any ways we could convince the community of the need to abandon this style of living?

--How does government (local, state, federal) attempt to control littering? How can your school help?

--How successful are these measures? What could be done to improve them?

Activity 4

Select class members who will write to paper manufacturers requesting the following information:

--When newspapers and magazines are reused or recycled, what amount of this scrap paper is equivalent to the usable portion of the average tree felled for paper production?

--What percentage of scrap paper waste is used for this purpose today?

--Is there potential for greater scrap use in the paper industry?

Once the answer to the first question is determined, have the students begin collecting magazines and newspapers until the necessary amount has been obtained. If this amount would seem to be unwieldy, work with a fraction of the amount. When the point has been demonstrated, the papers may be sold to a scrap dealer. Have the students make a recycling stack for writing paper in the classroom. Paper that has only been partly written on may be placed in the stack and then be used when students need scrap paper to solve problems, or the backs of the sheets may be used for drawings, etc. Discuss the problems of collecting and disposing of waste paper.

--What does your family usually do with waste paper?

--Could you just as easily give the paper to a collector as dispose of it in the manner you presently use?

--If it is inconvenient to do other than include it in the trash pickup, how important is the inconvenience?

--How much is waste paper worth to those who collect it and resell it? Where is the nearest waste paper recycling plant?

--How would we benefit from having a much greater percentage of the waste paper reused?

--Are trees a renewable resource? Why should we be worried about the depletion of our forests?

Activity 5

Lead a discussion of the meaning of recycling. Ask students to bring to class articles, pictures or models of things in our environment which can be and have been recycled. Some examples are:

junked cars → scrap steel
used newspapers → clean newsprint
bottles → returned to reuse ↔ remelted-recast
cans → reprocessed tin and aluminum
trash → glass tubing, building tiles

--Why do both rich and poor societies need to recycle the results of their technology?

--What is "planned obsolescence"?

--How can we encourage and take advantage of our "trade-in" practices (e.g. used cars for new ones, etc.) with retailers as a means of promoting one form of recycling?

Activity 6

Have the students learn about nature's water recycling via the following demonstration: Place some crushed limestone rocks on the bottom of a large jar or an empty aquarium. Add a 3-inch layer of soil on top of the limestone and plant some living moss, grass and/or fern. Moisten the soil with water. Finally, place a piece of glass over the top of the container. After several days, observe droplets of water clinging to the sides and the top of what is now a terrarium.

--Where did the water come from?

--How did the water get on the sides and the top?

--Why is it necessary to add water to a terrarium?

--How does this experiment illustrate the water cycle in nature?

--How do you think the increasing concentration of pollutants in the atmosphere affects the water cycle?

--Is this an example of nature's method of recycling?

Activity 7

Classroom wastes might be classified as organic or inorganic. Students should distinguish between the two types and, for a week, make a list of each kind found in the classroom at the end of the school day.

--What changes occur in organic matter in a compost pile under "proper" conditions?

--How do conditions in a compost pile transform organic matter into fertilizer?

--What is humus, and how is it formed? Of what value is it to man?

--Garbage is, for the most part, organic waste material. How would a hermit most properly dispose of his garbage?

--The hermit's solution to the disposal problem is obviously unsuitable for use in urban communities. Explain.

--How many large urban centers dispose of waste safely and healthfully?

--Why are strikes by sanitation workers especially serious examples of work stoppages?

Activity 8

Organize a class contest in which students may take part in developing new methods of disposing of waste materials. As part of the contest, the students may design new forms of packaging materials. At the end of the contest period, display the students' efforts and ask the class to develop criteria for determining the best entries and judging the winners.

--How did the Indians dispose of their waste materials?

--How did Americans in colonial times dispose of their waste materials?

--What were the consequences of the ways in which the Indians and early Americans disposed of their waste materials?

--How does affluence affect the type and amount of waste materials?

--What are some of the most modern methods used to dispose of our waste materials?

--How does the operation of incinerators affect our environment?

--How do landfill areas detract from our environment?

--How could families reduce the amount of garbage they create each day for a week?

--Does the waste and garbage dumped into the oceans miles from the shore contribute to pollution? Explain.

--What effects would a polluted ocean have on mankind? On one man? Explain using examples.

Activity 9

Show and discuss the following films:

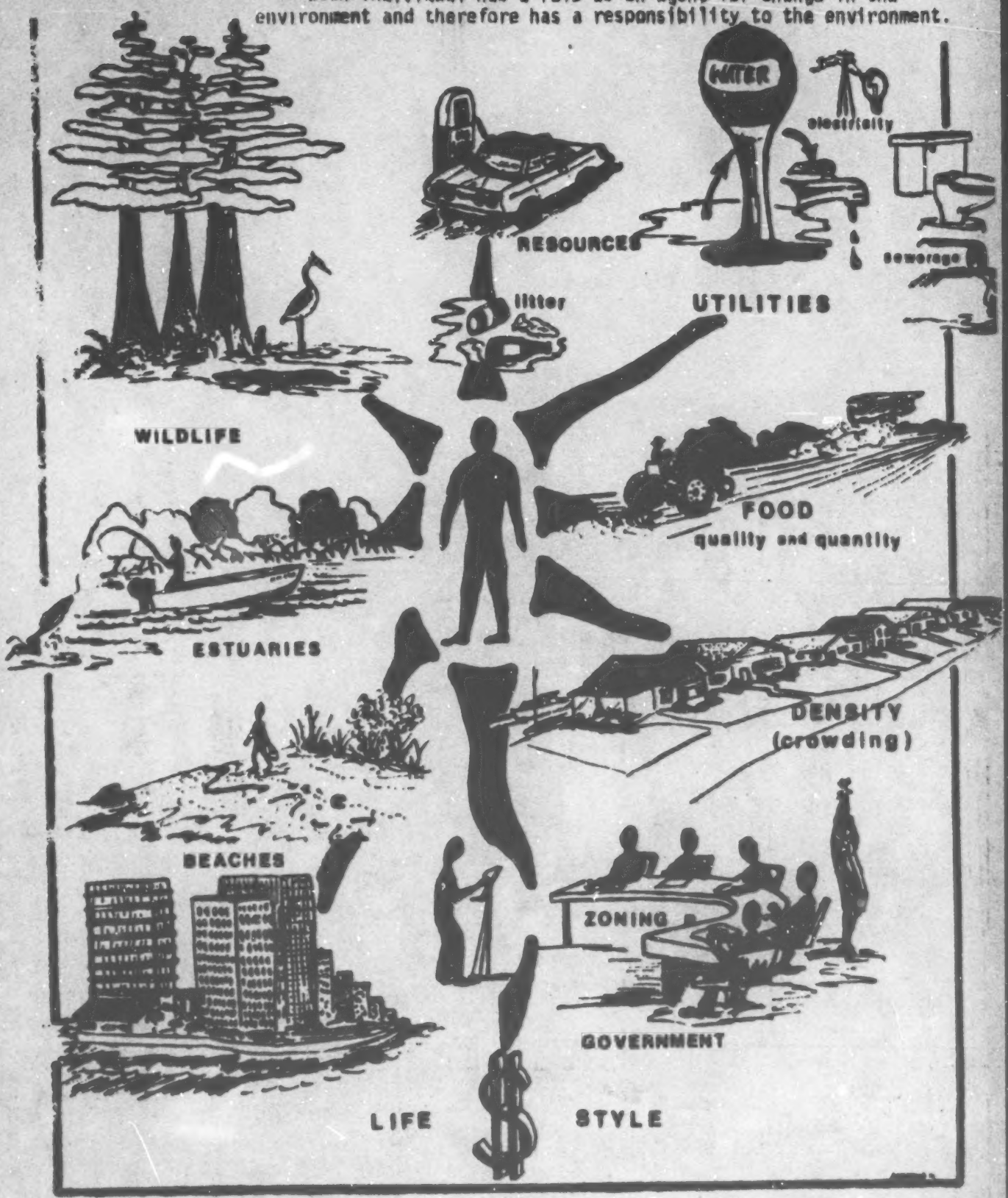
-Nation of Spoilers - 333-1-002

-Adventure in Conservation/conservation Series - 333-2-001

Also the filmstrip "Recycling Resources" -Continental Can Co. is available from the Largo C. & I. Building.

CONCEPTUAL SCHEME VI

Each individual has a role as an agent for change in the environment and therefore has a responsibility to the environment.



CONCEPTUAL SCHEME VI

Each individual has a role as an agent for change in the environment and therefore has a responsibility to the environment.

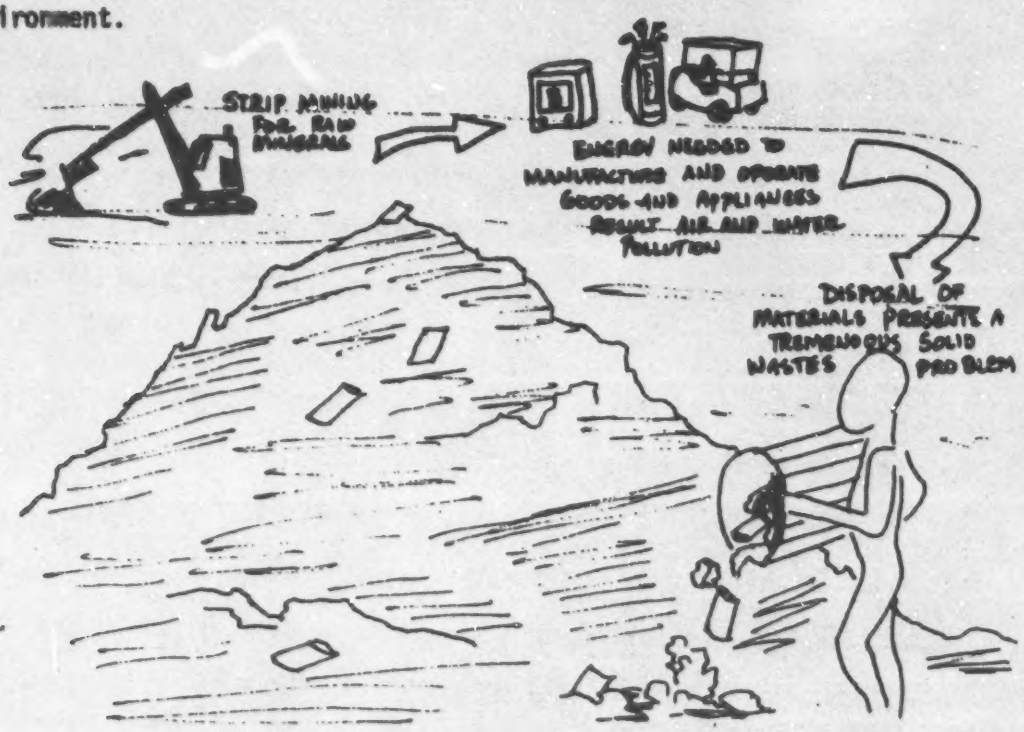
Each of us, by the nature of the way we live, has an effect on the entire area which we inhabit. We have a distinct effect on our physical environment, from the food we eat to the electricity and "toys" we require; clothes we wear; litter; garbage and sewage we produce.

The more we demand in the way of man-made products, services and comforts, the more our natural environments must be changed to accommodate us. In other words, we make trades continually. To use electricity, we must pollute our environment. To promote bigger cities and more people, we must change or destroy the natural landscape and its related ecological cycles. We must realize, however, most of our trades are irreversible and we cannot trade back for what we had before. For instance, a mangrove or cypress forest, which took millions of years to develop and upon which so many ecological interrelationships depend, cannot be reestablished once man has draglined or dredged and filled it for a housing development. It cannot, even in many generations of man, be returned to the productive swamp it once was. It is, for all practical purposes, gone forever.

We must become aware of how our trades affect us before we make them. Our purpose, therefore, is to create an environmental literacy through our society and each of us as individuals can begin to make knowledgeable environmental decisions.

Concept A

In purchasing manufactured goods we are frequently guilty of damaging the environment.


STRIP MINING FOR RAW MATERIALS
ENERGY NEEDED TO MANUFACTURE AND OPERATE GOODS AND APPLIANCES RESULT AIR AND WATER POLLUTION
DISPOSAL OF MATERIALS PRESENTS A TREMENDOUS SOLID WASTES PROBLEM

Activity 1

Trace some of the materials in the following list back to their origins. Each of the items is something you purchase by choice and their collection or manufacture can have an effect on the environment.

Gasoline	Electric appliances
Plastic toys	Automobile
Newspaper	Bicycle
Ink pen	Comic book
Paint	Fertilizer

--Since we damage the environment when we purchase these things, should we stop buying them?

--Should we be careful when we use these things so we don't destroy them too rapidly?

--Do we waste any of these things?

--When you buy comic books should you read them and throw them away?

--Can you ever minimize environmental damage by being careful which brands of an item you buy?

Activity 2

Ask:

--What material is your home made from?

List on the board the materials the students name: brick, wood, stone, rock, cement, mortar, block, stucco, shingles, etc.

Ask students to bring samples of materials used in home construction and pictures from magazines of different types of homes. Using these materials make a display on a table. Label the different kinds of materials. On a bulletin board above the display, place pictures of various types of homes. The title of the display might be MATERIALS FOR OUR HOMES COME FROM OUR ENVIRONMENT.

--Does the collection or manufacture of any of the building materials harm the environment?

--Obviously we must continue building homes. Can we minimize the damage to the environment by modifying the way we collect building materials?

Activity 3

Give your students pictures of everyday things such as pencils, bricks, carrots, etc., and have them find an object on campus that could be a source of their picture. Explain that the object does not have to be the actual plant, animal, or non-living thing but something similar. Discuss each picture and campus object. Bring out the idea of limited resources and wise use of our natural resources.

Activity 4

Have the students collect one thing from the school grounds. These things could be rocks, leaves, seeds, etc. Whenever possible, the object should be something the student has never seen before on the school grounds. Each child should hold his object up for others to see, then the rest of the class should tell what they know about the object. A variation on this activity is to place the objects around the room. Place a sheet of paper by each one. Allow the students to roam the room looking at the items. If a student knows something about the object, he should write what he knows on the paper near the object. Read the papers to the class.

Activity 5

Children go out on the school grounds and make a list of (1) three things they like; (2) three things they do not like. When the class reassembles, children discuss their results.

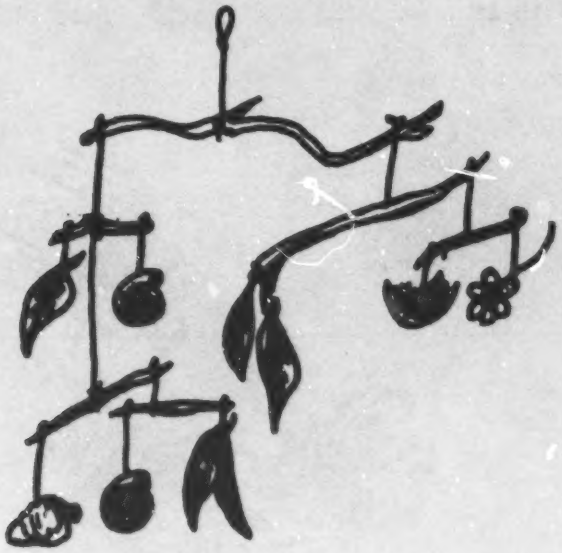
Follow-up Activity: Have the children review the listing of things they did not like and make two major decisions: (1) What would you do to correct or change the things you did not like? (2) What changes or side effects would result from your corrections? Emphasize "Interrelationships" and write on blackboard the quote from John Muir, "When we try to pick out anything by itself, we find it hitched to everything else in the universe."

Activity 6

Have your class prepare a series of short messages concerning the campus and school environment. Read these over the school public address system during morning and afternoon announcements. Try to include action and solutions to problems in the messages.

Activity 7

Have your students collect leaves, twigs, and other natural objects from the campus or home. Construct mobiles from these natural objects. The leaves should be press dried before use. The mobiles can be hung throughout the school before students take them home. Use natural objects or combinations of natural and man-made objects. A Pollution Mobile could also be constructed to demonstrate the differences between beauty and trash.



Activity 8

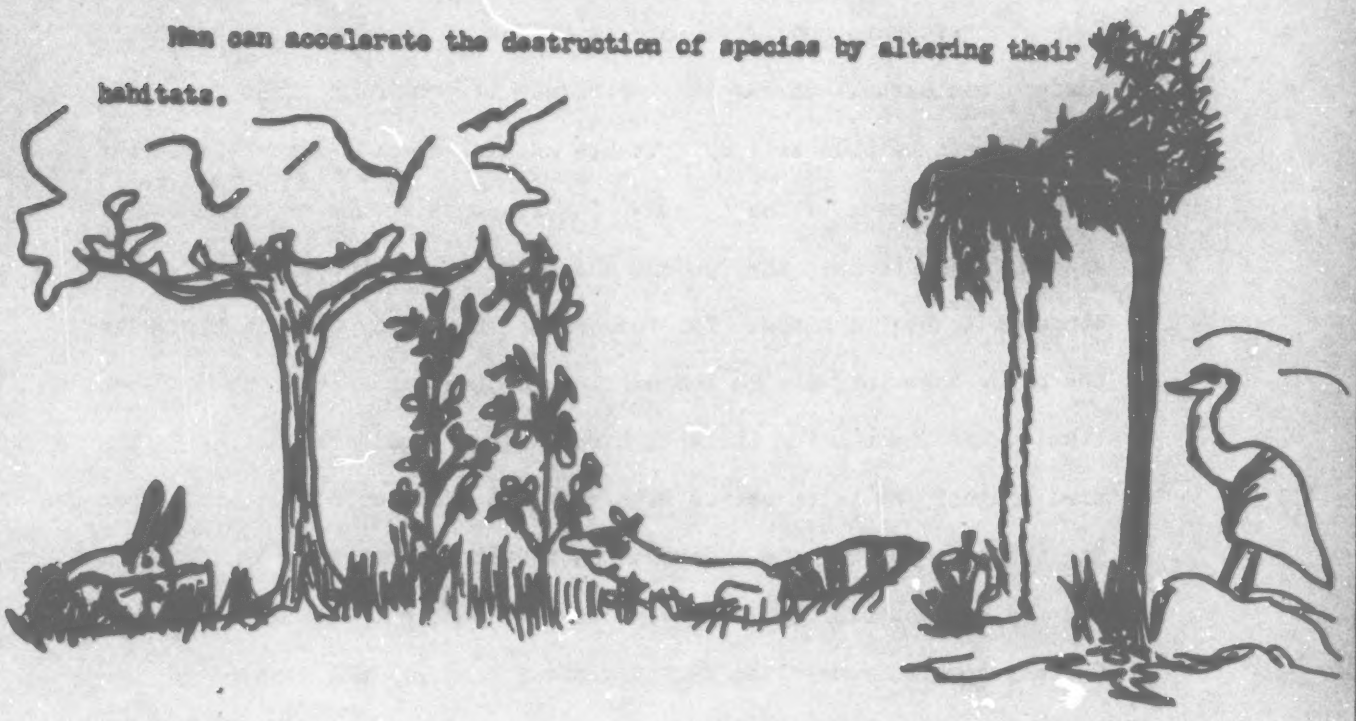
Have your class determine where litter barrels should be placed on the campus. One method for this survey is to have a clean-up day. Pick up all the campus litter. Then remove all litter barrels from the campus for two days. Have your students make a litter survey and indicate on a campus map areas containing the most litter. Place the litter barrels in these areas. Clean up any litter that was found at the end of the two day period. Check the campus periodically for new "litter hot-spots" and place barrels in these areas.

Activity 9

Obtain a plastic bucket and dig a hole large enough for the bucket to fit into. Fill the bucket with water and you have an instant minie pond. Have your students observe their pond every few days. In the mornings before school the teacher should drop waste paper, gum, candy wrappers, apple cores, and other assorted bits of trash into the mini-pond. Let your class "discover" their polluted pond. Ask the class to consider how many times they have contributed to this kind of pollution. What can be done to stop this ? How do they feel about their pond being destroyed by people?

Concept B

Man can accelerate the destruction of species by altering their habitats.



Activity 1

Discuss with the children the changes that take place from the wilderness environment to the urban environment.

-What makes up a wilderness environment?

-What maintains the natural balance?

-What happens when man upsets the delicate balance of nature?

-How would building roads change the natural balance?

-What happens to the wildlife in an area where roads are built?

-What happens to the landscape?

-What happens to the water supplies?

-How will the building of factories change the environment?

-What happens to the water life when factories begin to dump their waste into the water?

-What is needed to keep the factories in operation?

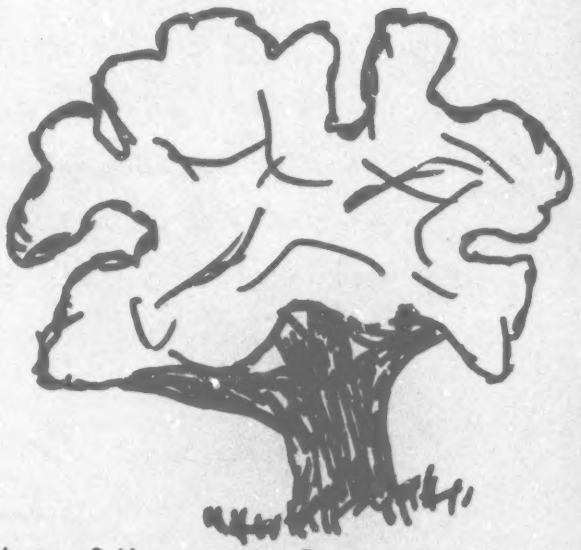
-As the towns and cities begin to grow what sort of pollutions begin?

Activity 2

Have your students construct several different types of bird houses, feeders and baths. Stress the importance of providing homes for birds that may not be able to find suitable natural homes. Place these homes in different areas of the campus. The students should organize maintenance teams to keep the feeders and baths filled and cleaned. Allow students to observe birds. The feeders and baths may provide places for the birds that they can no longer find in built-up areas. Keep a species list. What foods bring the most birds? What birds are nesting in the bird houses? Bulletin boards with magazine pictures of the birds frequenting the area can be made. Reports on the life habitats and natural history of each bird can be given. Have a member of the local Audubon Society come to your class and talk about birds of the area.

Activity 3

Have students take paper and a pencil outdoors. Tell them to find a tree on the campus. Each student should write a short poem or essay with the theme, "How I Would Feel If I Were This Tree."



Activity 4

Have your students make a wildlife inventory of the campus. Draw a map of the campus and locate trees, shrubs, and all areas where weeds and other plants are allowed to grow uncontrolled. What types of animals can be found in these wildlife areas? Is there any evidence that an area has been cleared of trees? Do the overgrown areas seem to attract wildlife more than the controlled areas such as lawns? Is there any evidence of pollution (smoke, litter, noise, etc.)? What can be done to

improve the campus for the wildlife? Should new trees and shrubs be planted? Where? How many? What kind? Prepare a wildlife inventory plan for your campus. To whom should this be presented? The principal? the PTA? The School Board?

Activity 5

Take your class outdoors and direct the children to role play what might happen in some of the following situations: A forest ranger, confronting a group of campers who have littered the area; an environmentalist, confronting a group of land developers; a commercial fisherman, confronting a dredge operator; a member of the Audubon Society, confronting a County Commissioner about zoning laws and population growth; a Z.P.G. expert, confronting a group of large families.

Activity 6

Have your children play the role of bees, flowers, mice, owls, trees, telephone poles, buildings, grass, soil, and air. Instruct the students to act like the thing they are playing, except that they are able to talk. Make up one of the following situations for the play acting: the day the sun didn't shine; the day there wasn't any water; the day the food ran out; the day when air pollution was bad; the day noise pollution was bad; the day people littered the area.

Activity 7

Ask students to locate evidence on their school grounds for a good and a bad change. Students should be prepared to support their answers. Teams are established as a "good change" team and a "bad change" team. Each team collects its list and a class debate is held considering which effect the school has most produced on the environment.

Activity 8

Show and discuss the film:

-Celebration of Life: Trees - 372-1-005

Activity 9

On an undeveloped portion of the school grounds, students should show "three kinds of direct or indirect evidence that people have been there." Encourage originality. Most students will choose litter as direct evidence. List as many examples as possible.

Activity 10

Show and discuss the filmstrip: Pollution, Coronet Sound Filmstrip Series - "What We Can Do." This is available from Martin Rainey, Harris Elementary Center.

ENVIRONMENTAL INTEREST ACTIVITIES

THE BALANCE OF NATURE

If it weren't for the birds, remember, my pet
The Balance of Nature would be upset
The insects of the world would surely double
And the people of the world would be in trouble

THE BALANCE OF NATURE MUST NOT BE UNBALANCED
THE BALANCE OF NATURE SHOULD BE UNDERSTOOD
IF THE BALANCE OF NATURE IS EVER UNBALANCED
WHATEVER WILL HAPPEN WILL NOT BE GOOD

If it weren't for the snakes, mice would multiply
And without the algae, the fish would die
The flowers and the fruits need pollination --
And the Balance of Nature, consideration

THE BALANCE OF NATURE MUST NOT BE UNBALANCED
THE BALANCE OF NATURE SHOULD BE UNDERSTOOD
IF THE BALANCE OF NATURE IS EVER UNBALANCED
WHATEVER WILL HAPPEN WILL NOT BE GOOD

If too many trees are chopped down, we have floods and soil erosion and a reduced water supply. If too many plants are destroyed, the animals may not have enough food and oxygen. If too many animals are killed, the minerals and carbon dioxide that animals supply to plants will be diminished.

REPEAT REFRAIN

There are thirteen animals hidden in this picture.

THE HOUSE THAT JACK BUILT

This is the house that Jack built.

This is the spray with the poisoned salt,
that lay in the house that Jack built.

This is the malt that was sprayed with the salt,
that lay in the house that Jack built.

This is the rat that ate the malt,
that was sprayed with salt,
that lay in the house that Jack built.

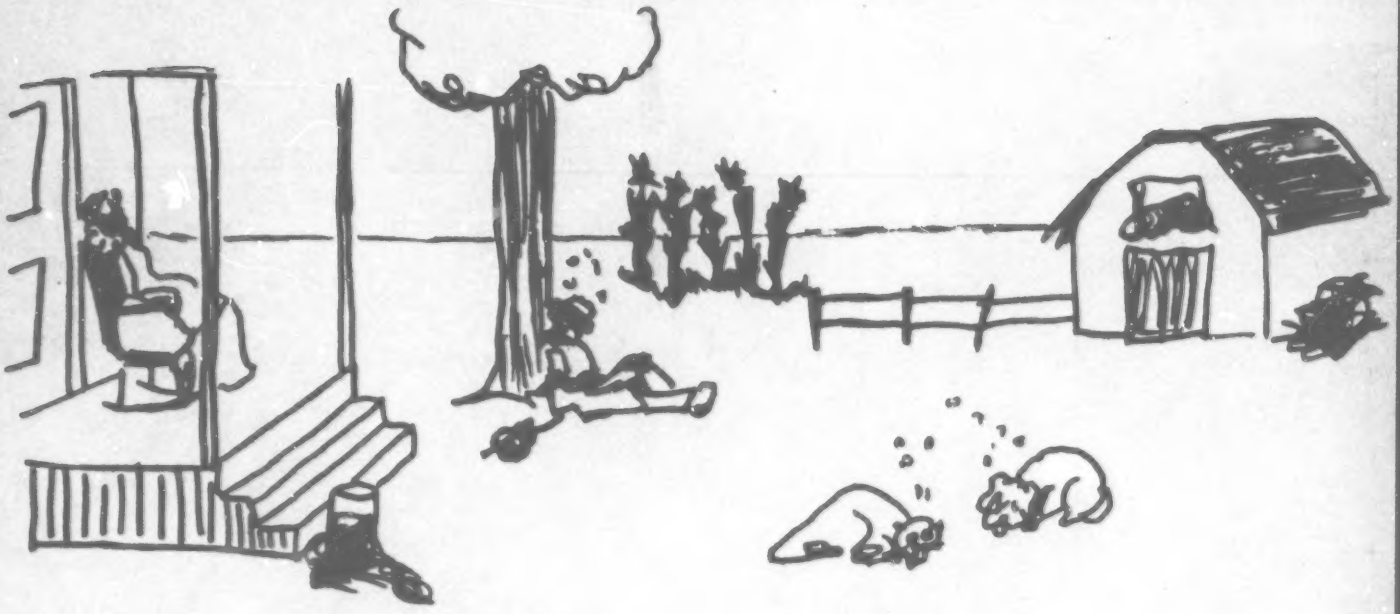
This is the cat, that killed the rat,
that ate the malt, that was sprayed with the salt,
that lay in the house that Jack built.

This is the dog, that helped the cat,
that killed the rat, that ate the malt,
that was sprayed with the salt,
that lay in the house that Jack built.

This is the cow with the crumpled horn,
who ate some malt and some poisoned corn,
that tossed the dog, that helped the cat,
that killed the rat, that ate the malt,
that was sprayed with the salt,
that lay in the house that Jack built.

This is the maiden all forlorn,
that milked the cow with the crumpled horn,
who ate some malt, and some poisoned corn,
that tossed the dog, that helped the cat,
that killed the rat, that ate the malt,
that was sprayed with the salt, that lay
in the house that Jack built.

This is the man all tattered and torn,
that shared with the maiden all forlorn,
that milked the cow with the crumpled horn,
who ate some malt and some poisoned corn,
that tossed the dog, that helped the cat,
that killed the rat, that ate the malt,
that was sprayed with the salt, that lay
in the house that Jack built.



This is the farm full of poisoned salt.
That should be a sign for us all to halt
this spraying of grain with a poison aim
That killing of pests and the rest.
That spraying of he and the spraying of she
is really the killing of you and me.
That's all -- for the house that Jack built.

"WHAT IS TRASH?"

What is trash?

Is it a bird?
Or even a feather
Never.

Is it a dog?
Maybe a frog?
No indeed.

What about a flower?
Or an April shower?
Not at all

Could it be a fish?
Or a worm? Squish...
No, no, no.

For these are all nature
And meant to be there.
Trash is all man-made,
Dropped without care.

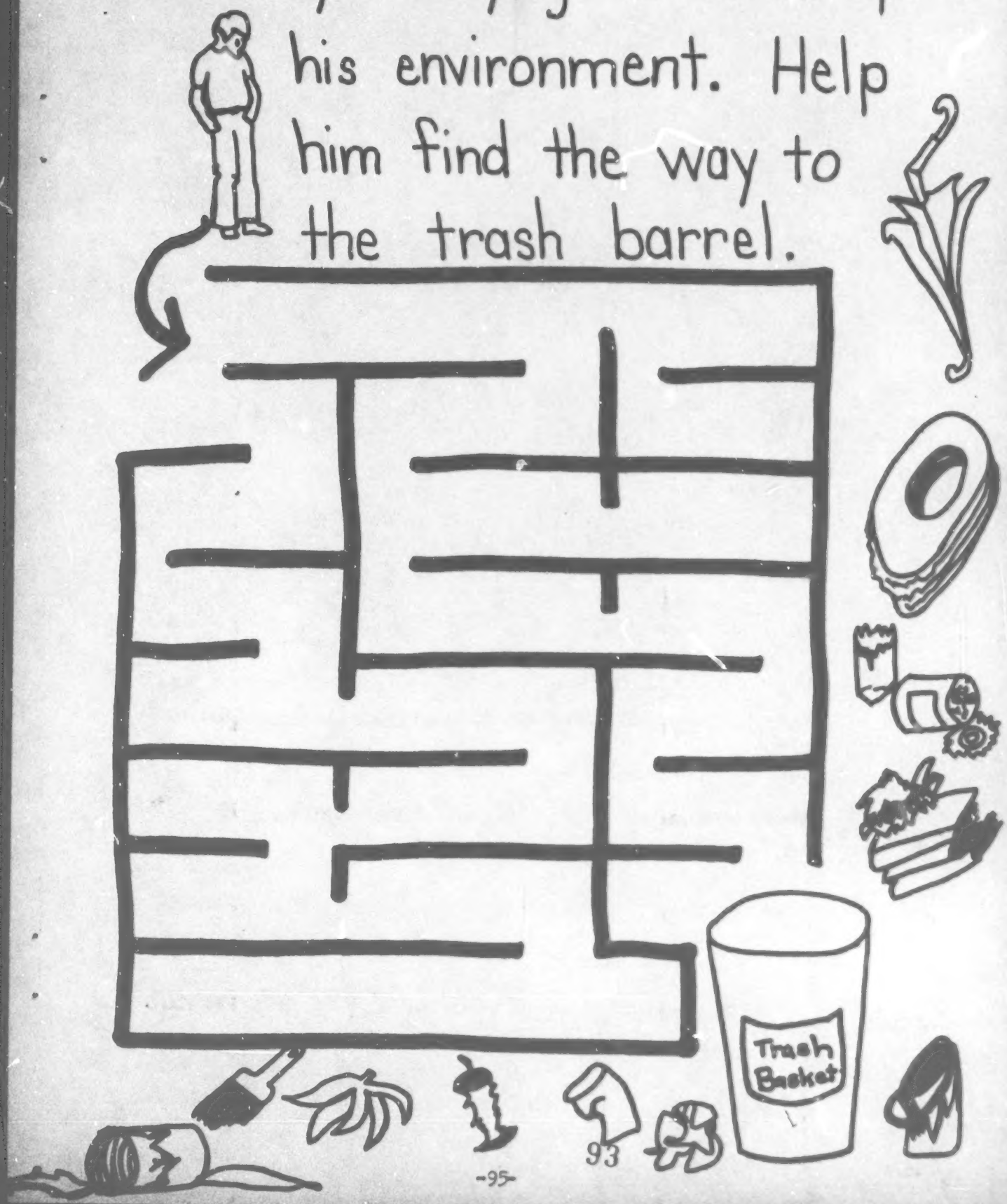
Paper, - tin cans, -
A bottle or two...
Can you also
Name just a few?

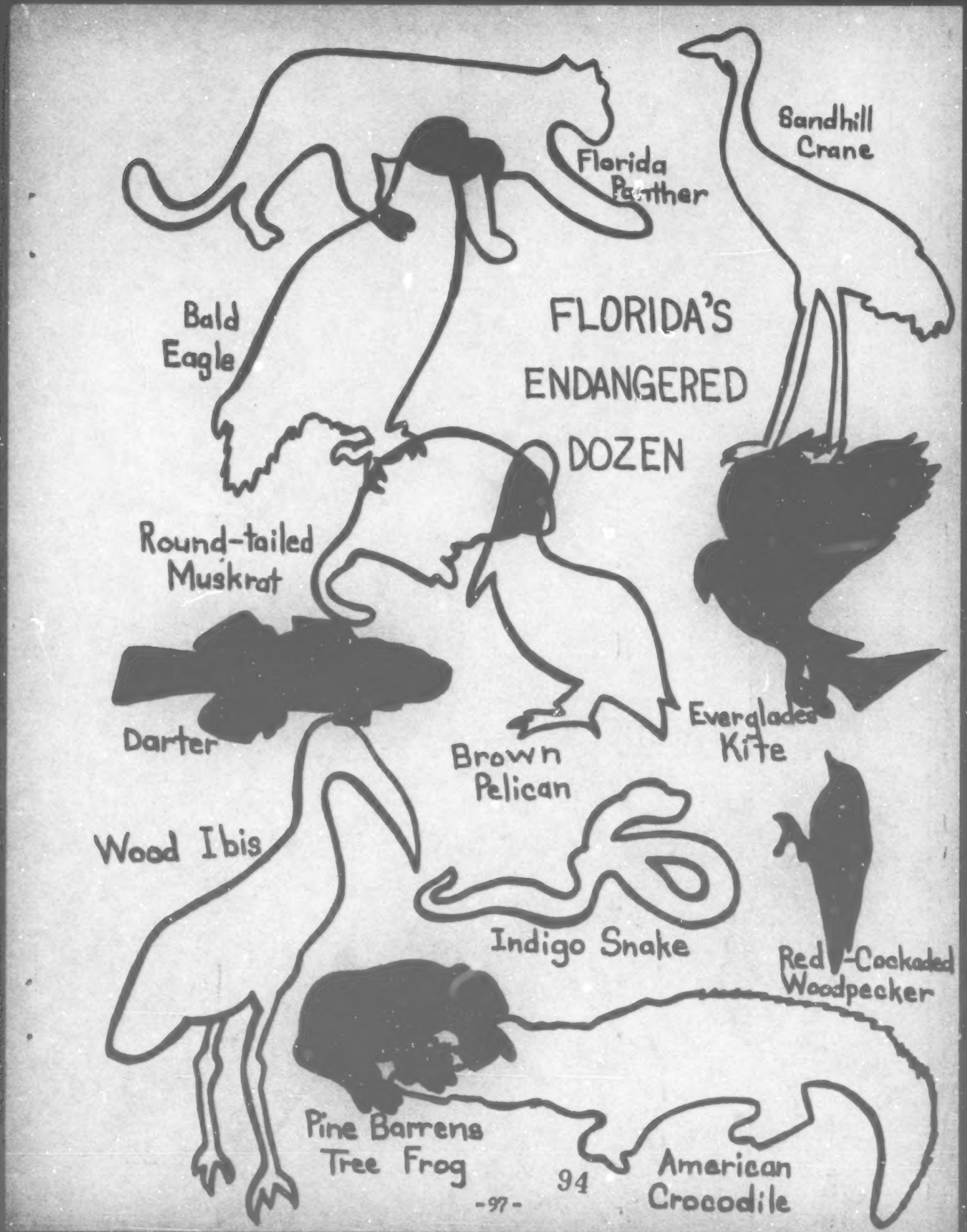
Please be a good neighbor
Any place you may be -
On picnics, in parks,
On the beach, in a tree -

Pick up all the litter,
The trash must go
So each of earth's creatures
May look up and grow.

By: Irene Marince

This boy is trying to clean up his environment. Help him find the way to the trash barrel.




FLORIDA'S
ENDANGERED
DOZEN
Florida Panther
Sandhill Crane
Bald Eagle
Round-tailed Muskrat
Darter
Brown Pelican
Everglades Kite
Wood Ibis
Indigo Snake
Red-Cockaded Woodpecker
Pine Barrens Tree Frog
American Crocodile

FLORIDA'S ENDANGERED DOZEN

Many animals live in Florida. Some are in danger. They may disappear. Why is this happening?

Many people come to Florida. They build houses. They fill in marshes. They change the environment. Look around. What changes can you see? Other changes are taking place, too. They are harder to see.

How do these changes affect the animals? They change the environment Wild animals become fewer. Their health is affected. Today, many species may disappear. They are called endangered species. There are 12 of these in Florida.

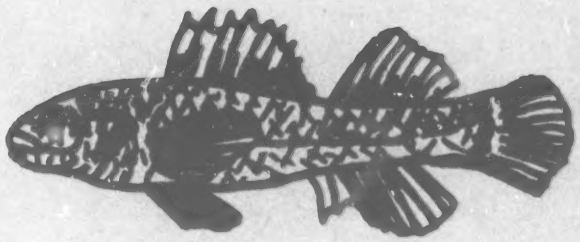
Studying endangered species may help them. It will also help other animals. It helps us. We can understand how we affect the environment. The environment affects us. We are inter-related.

These animals can be saved. Time is running out. Man must help.

WOOD IBIS

Look at this picture. Do you recognize the wood ibis? Many people call it a stork. This bird is in danger. Man is taking away its home. The wood ibis breeds in the Great Cypress Swamp. It raises its young there. The ibis needs lots of fish. Its young do too. The fish live in marshes. Much of the marshland is being drained. Man uses it for homesites. There are a few sanctuaries left. These are in danger too. The supply of food and water is threatened. Man is building around the area. The ibis must fly many miles for food. The ibis needs a large sanctuary. If man does not help, the wood ibis may disappear.

OKALOOSA DARTER



This animal is a slender little fish. Adults are only about two inches long. This fish is found mostly in Okaloosa County, Florida. Little is known about this small green fish. It lives in sand-bottomed streams. Mining operations will affect the habitat of this fish. So will dredging or land filling. Water pollution could easily cause its disappearance.

ROUND-TAILED MUSKRAT

The round-tailed muskrat can live on land. It can also live in the water. Some people call it the Florida water rat. It is a shy animal. It needs the marshes to survive. Man drains these marshes. He uses the land for farming. He builds homes there. This may cause the round-tailed muskrat to disappear. The water rat's home looks like a small haystack. It sticks out of the marsh. Muskrats build their homes with twigs and leaves. Inside, there is one room. There are at least two doors leading into the water. The muskrat can escape in time of danger. Muskrats build feeding platforms. They eat their food there. They eat roots, stems and crayfish. These platforms also have escape tunnels. Muskrats have many natural enemies. These include owls, minks and otters. Weasels, snakes and alligators also hunt them. Many other species depend on the round-tailed muskrat for food. It is an important link in the food chain of the marshland. Man may destroy the muskrat. He will destroy many other species as well.

AMERICAN CROCODILE

The crocodile is a leftover from the past. It looks almost the same as it did 200 million years ago. It was bigger then. Crocodiles were once found as far north as Daytona Beach. Now they are found only in the Everglades and the Keys. Crocodiles may seem ugly. They look vicious and stupid. The crocodile is important. He helps other creatures survive. Crocodiles live in salt bays and estuaries. They are bordered with mangrove trees. The crocodile does not like fresh water. Efforts to build the population have not been successful. In the early 1900's, hunters killed them by the thousands. They sold their hides for money. It is against the law to kill these animals now. Poachers still kill many of them. The crocodile will probably never adjust to man. Unless we can set aside areas for this animal, it will disappear.

INDIGO SNAKE

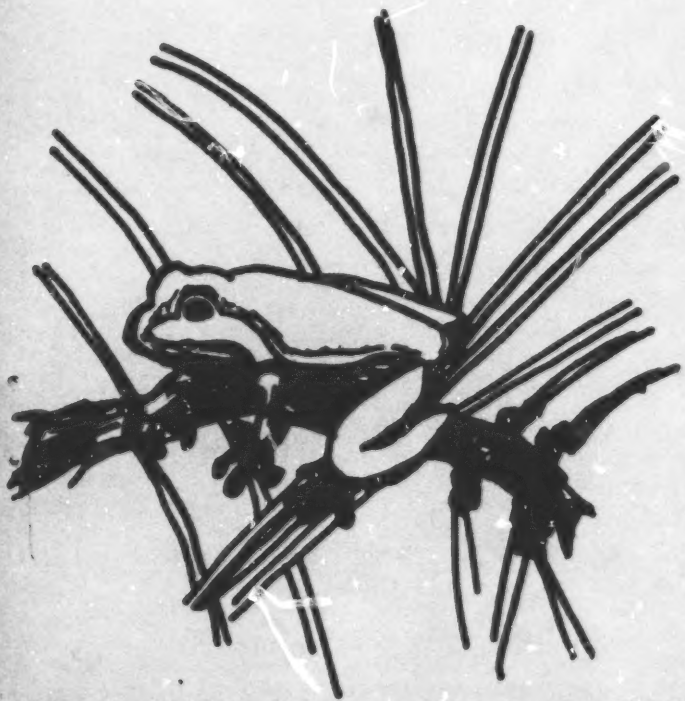
Most people hate snakes. They are afraid of them. Not all snakes are dangerous. The indigo snake is friendly. It is not poisonous. It rarely bites. It is easy to tame. The indigo is usually 5 to 6 feet long. It is a shiny blue-black color (indigo). Its chin and head may be orange-brown. The indigo eats rabbits, rats, and mice. Sometimes, it eats other snakes including the diamond-back rattlesnake. Rattlesnakes are poisonous. They are afraid of indigo snakes. They usually stay away from them. People have threatened the natural population of indigos. They collected them. This is no longer permitted. The indigo is fully protected. Many are still captured. Some are smuggled out of Florida. They are sold as pets. The indigo snakes face another danger. People are taking away many of their living areas. People must start helping indigos survive. They must stay in their natural environment. There may soon be no indigo snakes to collect.

FLORIDA PANTHER

The panther once roamed over most of North America. Now the panther lives in the Everglades. Panthers are carnivorous. They hunt deer and wild hogs. They also eat skunks, rabbits, and racoons. They cannot live where people do. Florida keeps adding people. The panther is being pushed into smaller areas. Laws keep people from killing panthers with a gun. They are being killed in another way. Man is taking their home. This kills them. Only half of the cubs live to become adults. If man does not preserve large areas for the panther, you may only see this animal in the zoo.

RED-COCKADED WOODPECKER

This bird has a small red ear patch. Another name for the patch is a cockade. This bird is about the size of a robin. It has a black and white "ladder" on its back. This bird stays away from man. It looks for old pine trees. It builds its home there. The woodpecker drills through the living wood. Inside, there is diseased wood. It clears away the diseased wood. There, it builds its nest. Red-cockaded woodpeckers are friendly to each other. They may build as many as ten nests in one tree. They use the same tree each year. When the tree dies, they look for a new home. This bird is in great danger in Florida. Most of the old pine trees have been cut. Each year, the lumber industry cuts many pine trees. The wood is used for many things. The men plant new trees. As the new trees grow, they are cut too. This bird can live only in old, diseased pines. Only an old, untouched forest will do. Unless we save such forests, the species will soon die off.



PINE BARRENS TREE FROG

The pine barrens tree frog is very small. It is only two inches long. It is very rare in Florida. It was not discovered until 1970. This frog has been found in only a small part of Okaloosa County. Little is known about the way this frog lives. In New Jersey, this frog lives in swamps and bogs. Man does not know what might harm this frog. This amphibian has been put on the endangered list. This is because there are so few of them.

SANDHILL CRANE

There are two kinds of sandhill cranes in Florida. The Greater Sandhill spends the winter in Florida. The Florida Sandhill lives and breeds in Florida. The number of these animals is getting smaller. The cranes live in wilderness areas. Man is invading these areas. He is destroying their breeding grounds. He is draining the wet prairies. He uses them as farmland. Sandhill cranes lay only two eggs. Usually only one young bird survives. It is very important to protect the young birds. Cranes choose open areas to build their nests. They can see enemies from far away. The wetlands also produce the birds' food. They eat roots, bulbs, and grains. They also eat insects, crayfish, lizards, frogs, and snakes. Today, the sandhill cranes live in the marshlands of central Florida. Some of these lands must be protected against development. If not, the sandhill will disappear.

BROWN PELICAN

You may have seen brown pelicans. Maybe they were flying above the water. Were they diving for fish? About 20,000 pelicans live in Florida. The brown pelican is in danger. The first threat is DDT. The story, "The House That Jack Built", explains how DDT reaches the pelican. The pelican eats fish that contain DDT. The fish will not kill an adult pelican. The DDT makes the egg shells thinner. If the shells get too thin, the young birds will die. Scientists measure the thickness

of pelican eggs. The shells in Florida are thick enough now. They have gotten thinner. If the DDT in the environment increases, the pelicans may die off. There is a second danger. Mangrove trees in many areas are being destroyed. People destroy the mangrove trees. People think they are ugly. They get in the way. People replace the trees with concrete walls. This takes away the natural habitat of the pelican. The slow-moving water between the mangrove trees contains food. Many animals depend on this food. If man keeps destroying the mangroves, he may hurt the pelican. He may also hurt many species of fish and shrimp. They breed in these quiet waters.

BALD EAGLE

The bald eagle is our national emblem. It stands for strength and courage. Its picture can be found many places. Look on money, medals, public papers, and stamps. It is even on the "Great Seal of the United States." The bald eagle is in serious danger today. These mighty birds reproduce well only in Alaska and Florida. They are threatened by man's activities. The use of chemical pesticides, loss of nesting trees, and shooting are three dangers. Florida eagles usually lay two eggs. They lay them early in winter. The eagle eggs may become thin-shelled. This happens when DDT builds up. It takes about a month for the eggs to hatch. At six months, the young birds can travel north for the summer. Eagles feed mostly on fish. They are also scavengers. They eat animals killed on highways. They even feed in garbage dumps. Some people break the national laws. They shoot or capture

eagles. These thoughtless hunters kill or injure many eagles. If this continues, the national bird may be found only in history books.

EVERGLADES KITE

There are several species of kites. The Everglades kite is in the greatest danger. It has a very limited "menu". The Everglades kite eats only one kind of food - the apple snail. These snails live in the marshes of the Everglades. When there is enough water, there are plenty of snails. The Everglades kites can feed themselves. They can feed their young. During droughts, the food supply decreases. The birds have to search very hard for their meals. Man has made this worse. He has cut off the natural flow of water. He stops the water into the Everglades. If the Everglades dry up, the kite will die. It will be one of the first species to go. Everglades kites live in breeding pairs. Each pair has its own territory. They defend it against other birds. If man disturbs the nests, the parent birds may abandon them. This is leaving the young to die. Man may take away part of their habitat. Then there will not be enough territory for all the kites. Some will not reproduce. Everglades kites are also threatened by fires. These come during dry seasons. They are threatened by floods. These come during heavy rains. They have natural enemies. There are also people who break laws. They kill these beautiful, rare birds.

MATERIALS BIBLIOGRAPHY

BOOKS: (available in your classroom)

People and Their Environment--Teacher's Curriculum

Guide to Conservation Education - Brennan, Ferguson Publishing Company.

Concepts in Science - Harcourt Brace

Learning by Investigation - Rand McNally (ESLI)

FILMSTRIPS: (Available from Science Supervisor, Largo C & I Building):

Life Cycle - National Geographic (Mammals, Fishes, Birds, Amphibians and Reptiles, Insects)

Recycling Resources - Continental Can Company

(Available from Martin Rainey, Harris Elementary Center):

Pollution - Coronet Sound Filmstrip Series, "Our Air".

Pollution - Coronet Sound Filmstrip Series, "What We Can Do".

FILMS: (Available from Pinellas County Media Center):

"Life on a Dead Tree" - 574-1-004

"Terrarium Classroom Science" - 635-2-001

"Cities and Shopping Where We Get Our Food" - 301-1-033

"Growing, Growing" - 631-1-006

"Where Does Our Food Come From" - 641-1-003

"Cities and Manufacturing Where We Make Things" - 301-1-030

"Looking Like What You're Not" - 591-2-016

"Camouflage in Nature Through Form and Color Matching" - 591-1-033

"How Nature Protects Animals" - 591-1-021

"Seasons" - 525-2-004

"Seasons of the Year" - 525-1-010

"Butterfly Mystery" - 595-1-011

"Our Animal Neighbors" - 591-1-022

"Nature's Half Acre" - 591-2-017

"Insects First Film" - 595-1-019

"Tad the Frog" - 597-1-012

"Looking at Fishes" - 597-2-022

"How Birds Help Us" - 598-1-008

"Looking at Reptiles" - 598-2-002

"Nation of Spoilers" - 333-1-022

"Adventures in Conservation/Conservation Series" - 333-2-001

(Available from Gulf Coast Lung Association):

"The Run-Around" - (address on page 63)